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The Prediction of Tenure and Job Performance based on the Job Activity Preference Questionnaire (JAPQ): A Concurrent Study

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THE PREDICTION OF TENURE AND JOB PERFORMANCE BASED ON THE JOB ACTIVITY PREFERENCE QUESTIONNAIRE (JAPQ): A CONCURRENT STUDY

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ABSTRACT

The Prediction of Tenure and Job Performance based on the Job Activity Preference Questionnaire (JAPQ): A Concurrent Study

by

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The purpose of this study was to assess the concurrent validity of the JAPQ in predicting the work output and tenure levels of persons employed in the occupation of Data Entry Operator-Financial Keyer. Three separate hypotheses were tested: (1) JAPQ-D^2 differences based on employee tenure and output loads; (2) JAPQ dimension preference differences, which may not be reflected in JAPQ-D^2 scores; and, (3) the relationship between employee tenure and employee output. Separate research questions focused on the applicability of the JAPQ in predicting employee tenure and employee output, based on multiple regression results.

Sixty financial keyers were administered the JAPQ for comparison against a concurrent PAQ job analysis. For hypothesis testing, the subjects were separated into four groups according to tenure or output. No differences were found in the overall JAPQ-D^2 score, comparing "high" (D^2 = 6.53) vs. "low" (D^2 = 6.60) output keyers and "long" (JAPQ-D^2 =

6.26) vs. "short" (D^2 = 7.16) tenured keyers. The keyer dimension profiles were highly similar, as indicated by positive correlations in the ranking of JAPQ dimension preferences for "high" vs. "low" output keyers (rho = .962; $p \geq .001$) and for "long" vs. "short" tenured keyers (rho = .979; $p \geq .001$).

No relationship was found between keyer tenure and keyer output ($r = .088$; $df = 58$). When viewing the data incorporated in this area, two employees with extensive tenure and below average output appeared to have skewed the data. The data for these two employees was deleted and a second correlation was completed, resulting in a positive relationship between keyer tenure and keyer output ($r = .426$; $df = 56$; $p < .01$).

Multiple regressions of JAPQ dimensions indicated promising predictability for "high output" keyers (adjusted R = .335; $p \geq .01$) and for "long tenured" keyers (adjusted R = .433; $p \geq .001$).

All results were discussed in respect to use of the JAPQ as an instrument for use in the personnel office. Recommendations for similar research is also mentioned.

(151 pages)

INTRODUCTION

Interest Inventories: Guidance Use

Vocational guidance counseling is an area that makes use of interest inventories to facilitate the process of career selection. The vocational counselor is the primary user of interest inventories, due to the fact that interest inventories are a good counseling tool which specifies areas of work that an individual may be interested in enough to consider.

In 1927, the Strong Vocational Interest Blank was first published. Since then, many researchers have spent a great deal of time investigating the assessment of interests and their relationship to vocations. Some of the more prominent interest inventories in use today include: the Strong-Campbell Interest Inventory (formally the Strong Vocational Interest Blank), Guilford-Zimmerman Interest Inventory, Kuder Preference Record, Kuder Occupational Interest Inventory, and the Vocational Interest Inventory.

The majority of the interest inventories are mainly concerned with identifying general groups of occupations or a few specific careers, rather than identifying specific areas of job interest and training (Cronbach, 1960; Darley & Hagenah, 1955). Sometimes specific information gained from the measurement device is useful to indicate whether an individual's interests are compatible with a specific occupation. The prominent interest inventories have reached a saturation point in their usefulness in assessing individual interests (Darley & Hagenah, 1955;

Super & Crites, 1962), and none of the more prominent interest inventories reach very deep into the wide variety of specific occupations available to an individual.

Psychometric concerns of interest inventories have been a lasting research focus. Earlier findings viewed the "older" inventories as: being fakable (Cross, 1950; Durnall, 1954; Longstaff, 1948); having made inappropriate use of ipsative rating scales (Bauernfeind, 1962; Katz, 1962); and showed a lack of generalizability (Albright, Glennon, & Smith, 1963; Guion, 1965). More recently, research has focused on contradictory evidence for predictive validity (Bartling & Hood, 1981; Borgen & Seling, 1978; Dolliver, Irvin, & Bigley, 1968; Dolliver & Will, 1977; Holland & Lutz, 1968; Slaney & Russell, 1981), social desirability factors in occupations (Longhurst, Note 1), and the changes within an occupation which may invalidate the interest key prepared for that occupation (Harris, Note 2).

Interest Inventories: Use as a Selection Instrument

Another use of the interest inventory is in personnel decisions, from hiring to placement to advancement. Selection testing, of various types, has shown increases in productivity (Schmidt & Hunter, 1981; Schmidt, Hunter, McKenzie, & Muldrow, 1979). Recent studies have indicated that performance and job success may be predicted through the use of interest inventories (Johnson & Hogan, 1981; Reeves & Booth, 1979). Even though the research is positive in these contexts, the actual use of the device in business has not yet been routinely established (Grant, 1980; Roberts, Note 3).

Research on selection testing is inconsistent with the actual use of the instruments in practice. This inconsistency is partially the fault

of giving research emphasis to socio-political issues such as racial or group differences in test validity, rather than content and criterion related issues (Tenopyr, 1981). When tests are used in the selection procedure there is a tendency to neglect the information derived from them (Schneider, 1978). As a result, selection testing is slowly being abandoned and less valid procedures for employee selection are being used, such as the interview (Grant, 1980; Schmidt & Hunter, 1981).

The civil rights movement of the 1960s placed pressure on employment testing to demonstrate the validity of testing. This pressure surfaced many legal issues that confront businesses which chose to test as a part of employee selection. A result of this movement was the creation of the administrative agency for enforcement of the Civil Rights Act of 1964 -- the Equal Employment Opportunity Commission (EEOC).

The EEOC has published the legal requirements for employment testing (EEOC, Uniform Guidelines, 1978). A reaction to these guidelines appears to be a flight from objective testing procedures rather than to comply with the guidelines. This is probably the primary reason for the abandonment of employment testing (Tenopyr, 1981).

Other reasons for the lack of employment testing and the use of an interest measure as an employment test are: The criterion-related research necessary to implement such measures is often not feasible (Dunnette & Borman, 1979) and, the cost of research and implementation is often overwhelming (Grant, 1980; Tenopyr, 1981). Despite the legal issues raised by employment testing, research continues to explore its potential in selection.

From the standpoint of the potential worker and potential employer the construct of "interest" is an aspect worthy of consideration; the

worker does not appreciate work that is of no interest to him or her. Also, it is not beneficial for the employer to have disinterested personnel, for interest in performing certain tasks required by a job is indirectly related to overall performance of that job (Sutermeister, 1969). The utilization of interest inventories can help identify an individual's specific area(s) of interest in a job. When the interests of the individual are used in conjunction with the aptitudes of the person, performance may be more effectively predicted. When both interest and aptitude are considered, the possibility of misplaced personnel and the negative outcomes of such misplacement can be reduced (Isaacson, 1972).

Interest inventories are developed to help individuals identify areas of work in which they may be satisfied. Smith, Kendall, and Hulin (1969) viewed one facet of job satisfaction as being the work itself. Longhurst (Note 1) saw the individual's interest in the many facets of the job as a direct contributor to job satisfaction. Seybolt (1976) saw this worker interest-job satisfaction variable as being an interaction between work environment characteristics and individual worker differences. Melamed and Meir (1981) have a clear point of view for the tie between interest in a job and satisfaction on that job. They have suggested that the level of congruence which is seen in an individual's interest in performing specific tasks and job behaviors which require those tasks may be directly related to vocational satisfaction.

Sutermeister (1969), and Landy and Trumbo (1980) concluded that employee interest in the various aspects of a job may be correlated with productivity on that job. Others have also seen job satisfaction as

being an influential factor in productivity (Hackman & Lawler, 1971; Orpen, 1979). If the following assumptions are correct, that is if interest affects satisfaction, and satisfaction affects productivity, then perhaps productivity can be viewed as a function of worker interest (directly or indirectly).

Hackman and Lawler (1971) have suggested that certain characteristics of the individuals themselves must be taken into account together with the characteristics of the job itself in order to generate valid predictions about the behavioral responses of the employee at work. A major problem in determining task and job effects on behavior is in the measurement of perceived job characteristics and the actual characteristics of the job (Hackman & Lawler, 1971). The actual work itself is often perceived incorrectly by individuals (e.g., the range manager who believes the job entails a majority of outdoor work only to find that the job entails desk work as a primary task). This misperception is often a major factor in job dissatisfaction (James & Jones, 1980), low productivity (Hoiberg & Pugh, 1978), and turnover (Dunnette, Arvey, & Banas, 1973).

Interest Inventories: A New Approach

A method of measuring interests in relation to actual job characteristics is available with the Job Activity Preference Questionnaire (JAPQ). This tool can be used as an instrument for the vocational counselor (by suggesting areas of interest), and also for personnel decision-making in pre-selection of potential employees, employee placement and employee advancement. Use of such an instrument might save the organization the direct loss of capital resulting from dissatisfied employees, low productivity, and employee turnover.

The JAPQ measures interests based on a similar rationale and method used in developing the Position Analysis Questionnaire (PAQ) (McCormick, Jeanneret, & Mecham, 1969a). The PAQ is a structured job analysis questionnaire which focuses on "worker-oriented" job elements present in a wide variety of jobs. These worker-oriented elements are those that are usually seen to characterize human behavior, either directly or by strong inference (McCormick, 1959). The JAPQ was developed as a parallel inventory to the PAQ providing for the expression of interest in the job elements defined and measured by the PAQ.

This worker-oriented aspect is distinquished from job-oriented elements, in that job-oriented elements reflect the use of task, job content, or the "technological" aspects of the job (McCormick, Jeanneret, & Mecham, 1972; Morsh, 1964; Morsh & Christal, 1966). The worker-oriented elements used in assessing human work can be termed as "common denominators" of work itself, relevant to any type of job since there is a limited number of human behavioral variables relevant to job performance (Mecham, Note 4).

The common denominators of work make possible a quantifiable job analysis which can be statistically evaluated (McCormick, Cunningham, & Gordon, 1969). There are three premises made in this analytical approach. First, a given job has the same behavior requirements for all persons on that job. Second, there is an assumed order or structured process in which the work is to be performed. And third, the use of worker-oriented job elements makes possible a statistical determination of the nature of a job structure (McCormick, Jeanneret, & Mecham, 1969b).

The JAPQ is useful in determining interests in virtually all jobs because it quantifies an individual's interests in behaviors found on the job (Longhurst, Note 1). Occupations obtained from JAPQ testing coincide with the Dictionary of Occupational Titles (U.S. Department of Labor, 1977). Data on each of approximately 2500 job titles have been collected over the last decade, by observing the work or interviewing workers and supervisors. This data base is frequently enlarged and updated for interest analysis with specific jobs. By matching actual job situations, activities, and requirements with individual preferences and experience, a more direct and valid comparison of an individual's interests in connection with a specific vocational aspiration can be made than is possible with most interest inventories which use personality theories and developmental theories as a basis for inventory development.

The major advantage of the JAPQ over other interest inventories is the direct connection with job analysis information and its interest-job interface, resulting in better insights and predictions of job preference (Longhurst, Note 1), job satisfaction (Pritchard & Peters, 1974), and employee tenure (Mecham & Hoskisson, Note 5). One of the strengths of the JAPQ is its ability to be matched with the PAQ. This allows for the analysis of interest in performing behaviors with the behaviors found on a job. The process by which this procedure occurs is to have knowledgeable persons complete the PAQ for a specific job. This develops a data base for that job and allows for the comparison of JAPQ interest results comparison on that job. These results are profiled for PAQ-JAPQ comparison on the sixteen JAPQ dimensions. The dimensions can be viewed as central interest categories for an individual.

The focus on behavioral job characteristics and worker interest in performing these tasks places a new view on an applied use of the interest inventory. Some of the problems with the utilization of such instruments may no longer be an issue with business. A main reason why a business may be open to the use of the JAPQ is because it requires the use of the PAQ. To apply the JAPQ operationally, the objective job analysis derived from the PAQ is an inexpensive secondary benefit which may be used for other personnel matters. Other reasons for applied use of the JAPQ stem from the logic that is at the basis of the instrument. Perhaps the major strength for the applied use of the JAPQ comes from the design of the instrument and its validation on an extensive working population.

STATEMENT OF THE PROBLEM

Interest inventories have been found to be predictive of vocational choice (Bartling & Hood, 1981; Dolliver, Irvin, & Bigley, 1972; Holland & Lutz, 1968), vocational satisfaction (Melamed & Meir, 1981), occupational success (Garbin & Stover, 1980), and also job performance (Johnson & Hogan, 1981). It would appear reasonable that such instruments would be widely used in business for selection and placement. But this is not the case. The issues of adherence to EEOC guidelines (Tenopyr, 1981), criterion-related research feasibility (Dunnette & Borman, 1979), and the costs associated with implementation of a valid instrument (Grant, 1980; Tenopyr, 1981) appear to be the reasons for a lack of selection testing in business. These reasons argue for more research which confronts the problems directly.

Guion (1965) feels that it would be an appropriate policy to hire those who are productive, dependable, and are likely to stay. But at this time one cannot measure these variables before they actually occur. Therefore, it is necessary for the potential employee to demonstrate characteristics prior to employment that are related to these characteristics on the job.

Since the practical value of any instrument used in employee selection and placement is in the instrument's ability to discriminate between successful and non-successful individuals (Landy & Trumbo, 1980), it appears that research in this area might appropriately address such

issues as concurrent and predictive validity, criterion feasibility, costs, legalities, and characteristics of job performance.

Mecham and Hoskisson (Note 5) found the JAPQ to discriminate job applicants in one area of concern for employment selection. They found that JAPQ interest profiles for short and long tenured persons on a specific job were different. A study by Pritchard and Peters (1974) also found the JAPQ to be a useful means for predicting various aspects of job satisfaction. Longhurst (Note 1) found that individuals' tend to prefer work which has behavioral characteristics similar to their own work interests.

Another employee characteristic which is related to tenure and job satisfaction is "employee-output"---number of pieces or goods produced by an individual. A complimentary investigation to the previous research would be to test the JAPQ's ability to discriminate employee output. A selection instrument capable of such a discrimination may have valuable potential for many employers. A study investigating employee output with Data Entry Operators revealed inverse relationships for employee age and tenure with employee output. It was assumed that this finding may impact JAPQ discriminability and should be considered in future research (Roberts, Note 6).

The need for valid selection procedures is real. Recent JAPQ studies resulted in objective ways to answer some important personnel issues. Further investigation of the JAPQ with other personnel and selection issues is needed. Studies of the type proposed here may result in a practical employee selection process which deals with today's employment concerns.

Purpose of Study

The purpose of this study was to assess the concurrent validity of the JAPQ with the occupation of Data Entry Operator-Financial Keyer (Financial Keyer). Specifically, this research investigated the ability of the JAPQ to discriminate between employees on the basis of output and tenure. The following hypotheses were tested:

Hypotheses

Hypothesis I. There is no difference in the JAPQ-D^2 score (see page 25 for D^2 process) between the highest and lowest producing Financial Keyers (productive and output will be interchangeable).

Hypothesis II. There is no difference in the JAPQ-D^2 score between the longest and shortest tenured Financial Keyers.

Hypothesis III. There is no difference in the pattern of JAPQ profile dimensions between the highest and lowest producing Financial Keyers.

Hypothesis IV. There is no difference in the pattern of JAPQ profile dimensions between the longest and shortest tenured Financial Keyers.

During the pilot investigation of this study an inverse relationship was found in employee tenure when compared with employee output (Roberts, 1981a). It was assumed that this finding may have been due to chance or poor sampling procedures. Therefore, the following hypotheses were also tested:

Hypothesis V. There is no relationship between employee output and employee tenure.

A secondary research purpose was investigated in the theoretical basis of the JAPQ and its practical use in predicting employee output and tenure. In this investigation the following questions were asked:

Research Question I & II. When combining all JAPQs from a specific job, the resulting JAPQ profile is representative of a concurrent interest profile for employees on that job. Since this is one aspect of the JAPQ's theoretical basis, which profile dimensions best predict (1) employee output and (2) employee tenure for the job of Financial Keyer?

Definitions of Terms Used

Position Analysis Questionnaire (PAQ). A structured job analysis questionnaire which measures worker-oriented job elements present in a wide variety of jobs (see Appendix A).

Job Activity Preference Questionnaire (JAPQ). An interest inventory which measures expressed interest in work behavior job elements of the PAQ (see Appendix C).

JAPQ-D^2. An overall match between an individual's interest in performing JAPQ job elements and those elements which are found on a specific job.

Employee Output. The average number of pieces produced per hour by an individual, averaged over the 30 days preceding JAPQ participation ("productivity").

Employee Tenure. The number of months an individual has been on the job of "keyer."

Employee Age. The chronological age of a person in years.

REVIEW OF LITERATURE

The practical beginning of an interest device began in 1919, when Strong and his associates first dealt with the phenomena of vocational aspirations and interests as important aspects of human behavior. It was suggested by Strong (1943) that an adequate measure of man's interests will be the best approach to a more complete understanding of him. Bordin (1943) added to Strong's suggestion by expressing that vocational interests pervade all phases of human life and form one of the mainsprings of an individual's actions.

Carter (1940) viewed vocational interest as a developmental process with no specific age for determining any vocational pattern. The transition process through which adolescents move through in high school and perhaps in further training, into a work setting is not fully understood. Longhurst (Note 1) views vocational aspirations as a function of interest that prevails in every person. The insight derived from the more prominent interest inventories shed little light in the direction of specific vocational choice. A principal weakness is the lack of content validity of the interest measurement questions themselves (Anastasi, 1976).

Vocational Interest Theory

There are various vocational theories used as a base for the interest inventories in use today. Bordin (1943) saw vocational interest theory as having three separate perspectives. The first is a static view

which argues for a biological synthesis in vocational interests, remaining fixed once the individual reaches maturity. The second perspective is one of a dynamic view, which is seen as an integration of psychological influences that are subject to change with the person's homeostatic and adaptive processes. The third perspective is an empirical view which suggests sets of preferences that can be shown to differentiate successful persons in various occupations from persons in general.

Ausubel's (1954) vocational interest theory integrates the maturation of the individual into the process. A person must possess intrinsic feelings of adequacy and worth before he/she can make a choice in vocation. The person acquires feelings of self-worth by exploration, mainly in adolescence, which is a critical period for vocational aspirations. During this phase of exploration the person seeks educational experience, makes independent decisions, and acts through different roles. This establishment of individual identity plays a major role in the vocational aspirations sought in the future for the individual.

Ginzberg (1971) and Super (1957) view vocational choice as a developmental process through several stages. Ginzberg conceptualized the developmental process as an early fantasy of self, followed by a more realistic identity-seeking, and leading to the final stage of stability and maturity. The stage at which the person experiences tentative choice comprises three exploratory stages: examination of the self with environmental factors; crystallization of the self with the environment; and specification of the self into the environment. Ginzberg, Ginsburg,

Axelrad, and Herma (1951) have also classified work aspects into three types: those related to the work activity itself, involving intrinsic accomplishment of specific ends; those related to the returns of work, such as wages and prestige; and those related to the concomitants of work, such as those derived from working in particular work settings or with particular co-workers and supervisors.

Super (1957) associated developmental tasks with the exploratory stage to include testing through trial jobs until there is a foundation for vocational choice. Both Ginzberg and Super maintain that a person must advance through the stages of vocational development prior to a more realistic conceptualization of specific vocational choice.

More recently, Holland (1973) theorized vocational development is based on the assumption that people were any one of six personality types, or some combination of these six: realistic; investigative; artistic; social; enterprising; and conventional. These personality types are also seen in the environment. The extent in which the person and environment are similar can be observed in vocational choice, vocational stability, and achievement.

The theory behind JAPQ development assumes vocational patterns existing in a behavioral context. This theory stresses that there is a limited number of worker-oriented behaviors which tend to characterize jobs (Mecham, Note 4). Interest in performing the behaviors found on specific jobs constitute the basis for person-job predictions from the JAPQ. Thus, if an individual does not desire to perform activities related to being a carpenter, the score obtained from the JAPQ will reflect such a discrepancy.

Issues in Experimental Design

Dolliver (1969) mentions several experimental design problems which can be found in recent as well as past research with interest inventories. The major problems have been found in attrition of subjects and sample selection. These problems may be a key reason for the varied results in interest inventory investigation.

College students compromise most samples used in investigating interest inventories. Worthington and Dolliver (1977) state that a heavy use of counseling center clients may have a large impact on sampling issues. The students used in studies by Enright and Pinneau (1955), Holland (1962; 1963), McArthur (1954), McArthur and Stevens (1955), and Strong (1935; 1943), were not a representative sample of their own college populations (Dolliver, 1969), yet research findings were generalized to the larger population.

Student populations have been found to have expressed ideas of vocational aspirations which equal or exceed inventoried interest measures (Bartling & Hood, 1981; Dyer, 1939; Enright & Pinneau, 1955; Holland & Lutz, 1968; Slaney & Russell, 1981). This was noted by Power, Holland, Daiger, & Takai (1979) and Slaney (1978) where persons may take interest inventories to confirm vocational choices rather than to expand them.

Brousseau and Prince (1981) view interest inventories as an extension of the individual's expressed vocational aspirations. This may exist where respondents have learned responses compatible with persons in particular job categories. The amount of learning in this area may be even greater for a college population, due to the amount of education received in their vocational direction.

Bartling & Hood (1981) and Slaney & Russell (1981) have expressed concern in the generalization of research findings with women. The recent transitions in womens' work roles may invalidate many studies, thus caution should be taken when attempting to generalize from these research findings where the population sampled may be in a state of change. Longhurst (Note 1) found the JAPQ to be an instrument that can be adapted to the changes in today's transition of work roles, and is accomplished through the continual updating of job analysis. This gender adaptation was indicated with Longhurst's finding that JAPQ results are useful for women and men.

Research in Validation

The majority of research with interest inventories has focused on their effectiveness in vocational placement predictions. A vast majority of this research has been accomplished utilizing the Strong or Strong-Campbell inventories. A secondary emphasis has contrasted these instruments with an individual's expression of vocational interest (a stated vocational aspiration).

Predictive validity studies of persons taking Strong Interest Tests or other Holland personality type inventories have resulted in good person-vocation matches with 29% to 38% accuracy. Poor person-vocation matches are approximately the same percentages (Bartling & Hood, 1981; Dolliver, 1969; Dolliver, et al., 1972; Worthington & Dolliver, 1977). Dolliver and Kunce (1973) and Worthington and Dolliver (1977) found the predictive validity of these measured inventories tend to decrease over time. This is observed where the good person-vocation match percentage

tends to decrease, while the poor person-vocational match percentage tends to increase.

Concurrent validity studies with interest inventories have found good person-vocation matches with 36% to 58% accuracy. Poor person-vocation matches are being reported in the range of 34% to 46% (Dolliver, et al., 1972; Worthington & Dolliver, 1977).

Worthington and Dolliver (1977) state that the majority (if not all) of the studies reported have a major problem in the placement of a job into a job category. This problem will always exist when numerous occupations are being placed into relatively few job categories. Longhurst (Note 1) viewed the JAPQ use of DOT job classifications as a resolution to this problem in comparison with other interest inventories.

Another area with implications of inventory validity is their use in predicting academic success. Slaney and Russell (1981) found that both interest inventory measures and expressed interest were predictive of a persons' college major. Peterson (Note 7) investigated the JAPQ and the Strong Vocational Interest Blank (SVIB) with the prediction of college grades. The findings were that both of these instruments were predictive of grades, with the JAPQ having higher correlations for both women (JAPQ, $r = .60$; SVIB, $r = .28$) and men (JAPQ, $r = .75$; SVIB, $r = .19$). Campbell and Johnson (1966) also used the SVIB to predict scholastic achievement, resulting in a correlation of .36.

Use as a Personnel Instrument

Interest inventories have a shallow background in their use as employee or personnel instruments. The areas of job satisfaction and job

performance have received some attention in the literature, with implications of interest inventory use.

Dolliver, et al. (1972) found the SVIB to have a poor relationship with job satisfaction. The major finding in this study was the lack of relationship with being satisfied with one's job and having a high score on the SVIB scale for that job. This result may have been due to the design for grouping of satisfaction responses. The researchers found very few persons reported themselves as being less than satisfied, which altered the researchers' item grouping for their statistical testing.

Worthington and Dolliver (1977) found the Strong-Campbell Interest Inventory (SCII) was related to job satisfaction and satisfaction with the type of work being performed. This supported Strong's (1955) hypothesis that the higher a person's occupational scale score the more likely the person will see oneself as being satisfield with their job. A possible concern in this study was with the use of self-reported information used as satisfaction indices. The researchers expressed that this type of information may not be a true measure of work and job satisfaction.

Pritchard and Peters (1974) report that when JAPQ interests matched the job duties, as determined by PAQ job analysis, job satisfaction tended to increase. This study used the Minnesota Satisfaction Questionnaire in determining job satisfaction in general. At the time of this investigation the JAPQ dimensions had yet to go through the factor analysis process in determining the "best fit" for JAPQ elements into dimensions. For this reason, the 32 PAQ dimensions were used for statistical analysis and may have yielded different results if the 16 JAPQ dimensions would have been utilized.

Police performance was investigated by Johnson and Hogan (1981). This study found that Holland's (1973) Artistic and Conventional scales were correlated with effective police performance (performance was measured by letters of appreciation and letters of compliance).

Another study of police performance was reported by Ronan, Talbert, and Mullet (1977). This study found that the PAQ was useful in obtaining performance information relevant to work. This information was helpful in the construction of selection instrumentation utilizing PAQ job performance behaviors. The results of this study showed that effective instrumentation may be developed through the use of PAQ job analysis information.

Roberts (Note 6) investigated job performance with data-entry operators by utilizing the PAQ job analysis. The PAQ analysis profile served as a data base for JAPQ interest comparison, with high and low performers on this job. The results showed no difference in JAPQ-D^2 score for the two groups. An analysis of the JAPQ interest profile for all job performers showed that the employees investigated were similar in their interest in performing work behaviors relevant to data-entry job performance. An interesting aspect in performance with this job was found in inverse correlations with employee age and tenure with job performance. No conclusions were made for this finding.

In a study of bank teller turnover, Mecham and Hoskisson (Note 5) found that JAPQ interest profiles were different for bank tellers than for persons in general. This study also found that JAPQ profiles were different for tellers who left the job prior to eighteen months (18 months was determined by the business as the amount of tenure necessary

for consideration as an asset to the business) and for tellers who remained on the job in excess of eighteen months, and were still employed. An outcome of this study might result in the business's selection of potentially longer tenured employees through JAPQ applicant screening.

Interest inventory use still occurs routinely in the office of the guidance counselor. Interest inventory use in business and industry has yet to be tested to the extent necessary for use as a personnel selection instrument. The studies of JAPQ use in this area are revealing and promising.

The format of PAQ job analysis comparison with JAPQ interests in performing these critical job behaviors, may be an answer for many organizations who are skeptical over employee selection instrumentation and adherence to the EEOC's uniform guidelines.

Perhaps, the future will bring with it more investigation in this area of interest inventory use as a selection instrument. At this time there is little information on the use of interest inventories, which could be a logical extension from the office of the guidance counselor to the placement office in many businesses. Research is needed for this extension to take place.

METHOD

Subjects

The subjects used for this investigation consisted of individuals performing the job of Data Entry Operator - Financial Keyer (Keyer) for a large financial corporation in the southeastern United States. This job was selected due to the corporation's concern for the high turnover rate in this position (50% turnover within a 12-month period is not unusual) and a wide variance in employee output. The employees on this job consist of a wide variety of ethnic backgrounds, primarily caucasian, black, and hispanic. All individuals receive a 90 day probation and training period prior to being retained as a "full-time non-exempt" employee. The workforce consisted of 104 female and one male full time employees.

The average number of completed pieces produced by the entire workforce was 864 per hour. The employee output data was based on the company's employee production record. This production record is a fair measure of an individual's output: there is a constant and consistent amount of material available for processing; the machines used are similar; if machine problems do arise other machines are available; on the average, the material for processing is consistently similar in content and in the amount of time it takes for processing. The company keeps accurate daily records for each employee on this job throughout their entire tenure. Each employee's output rate (# of pieces per hour) was based on their daily average for the previous 30 days prior to this investigation.

To gain as much employee output variance as possible, the employees were categorized, for hypothesis testing, into four groups (due to training factors no employees on their three-month probation and training period were used in this investigation). These groups were identifed as:

"High Output". N = 33, $\overline{X}$ completed pieces of goods per hour = 993.06; S_d = 99.74, with a range of 856-1200. The median tenure for this group was 24 months, with an average age of 26.12 years.

"Low Output". N = 27, $\overline{X}$ completed pieces of goods per hour = 706.81; S_d = 57.46, with a range of 579-804. The median tenure for this group was 19 months, with an average age of 29.81 years.

The second two groups were categorized on a tenure basis of sixteen months or less and seventeen months or more, on this job. These tenure figures have been established as the point in which most employees shift from a corporate liability to a corporate asset. This separation point is pliant to productivity variables. The corporations most recent human engineering reports have found this "tenure point" to be the most accurate with all variables accounted for in this job.

"Long Tenured". N = 40, Median tenure = 27.50 months of continuous employment; range = 18-156 months (two individuals had extensive tenure; 144 and 156 months), with a $\overline{X}$ output of 907.73 completed pieces per hour; S_d = 156.62. Their average age was 28.58 years.

"Short Tenured". N = 20. Median tenure = 9.25 months of continuous employment; range = 4-16 months, with a $\overline{X}$ output of 772.30 completed pieces per hour; S_d = 141.09. Their average age was 26.2 years.

The PAQ job analysts consisted of one female and six males seen as highly knowledgeable in the specific functions of the keyers' work. These analysts were: Three immediate supervisors, who also fill in as a keyer

when the department is pressed for output; three shift supervisors who oversee operations and serve as mediators between production and staff; and, the keyer's staff manager. All analysts had the individual characteristics of college education and behavioral job knowledge which Smith and Hakel (1979) found to be traits in reliable PAQ job analysts.

Measures

The Position Analysis Questionnaire (PAQ)

The PAQ was used as an objective job analysis instrument. This instrument is a standardized questionnaire used to rate a job in terms of the worker-oriented requirements made on an individual to perform the job.

This PAQ job analysis was used as a data base against which JAPQ interest scores was compared. In other words, employees' interests as measured by the JAPQ was compared to the job requirements as measured by the PAQ.

The PAQ consists of 187 items organized in the categories of Information Input (e.g., use of written material); Mental Processes (e.g., decision making, reasoning, planning/scheduling); Work Output (use of precision tools/equipment); Relationships with Other Persons (e.g., communications); Job Context (e.g., physical working conditions); and Other Job Characteristics (e.g., expectancies and infrequent events). All items to be answered indicate: degree of use, frequency of occurrence, importance of element, etc., for the 187 elements on a 5-point Likert scale, with the option of answering "does not apply" (see Appendix A). There are forty-five job dimensions McCormick, Mecham, and Jeanneret (1977) derived from the items which complete the PAQ.

PAQ validity is based on the concept of "job-component" validation. This process consists of:

> (1) some method of identifying the constituent components of jobs; (2) a method for determining the human attributes required for successful job performance when a given job component is common to several jobs; and (3) some method of combining the estimates of human attributes required for individual job components into an overall estimate of the human attribute requirements for an entire job (McCormick, et al., 1977, p. (11).

The PAQ has been shown to meet the requirements of job-component validity in its rationale and extensive development (Prien, 1977). Further evidence of this validity is seen in studies comparing the PAQ with the General Aptitude Test Battery and several commercial aptitude tests (McCormick, et al., 1977). This concept of job-component validity is one approach to test validity that appears to be highly compatible with the EEOC's Uniform Guidelines (McCormick, DeNisi, & Shaw, 1979).

Individual element reliabiility coefficients ranged from .00 to 1.00, with an average of .80 (McCormick, et al., 1969a). Taylor & Colbert (1978) tested PAQ inter-rater reliability resulting in reliability coefficients of .68 with one group of paired job analysts and .78 with another group of single job analysts.

The Job Activity Preference Questionnaire (JAPQ)

The JAPQ was used to compare employee interest in performing job behaviors, with those behaviors identified by the PAQ analysis as being a factor in job performance.

The JAPQ is an inventory which measures job interests utilizing an approach similar to the job analysis approach used with the PAQ. One

hundred fifty of the one hundred eighty seven PAQ items were revised into a 6-point Likert scale, with respondents answering by rating how important/to what degree they would like each of the 150 job elements to be in their work. Of the 150 elements, 149 were taken directly from or slightly revised from the PAQ. The PAQ items which were not ammendable to such a revision or had very low reliability were eliminated from the JAPQ. The one element not taken from the PAQ and included on the JAPQ is element #133, which reflects degree of competitiveness. Since no appropriate measure of competitiveness is available it is not included in the JAPQ analysis.

The respondents answers are not weighted by a comparison with a criterion group. JAPQ responses are directly compared with the degree of presence for each element in their specific job, as measured by the PAQ job analysis.

Through factor analysis of the 149 items common to the JAPQ and the PAQ, 16 job dimensions (factors) have been derived by analyzing job data representative of the U.S. population, as reported in the 1970 census (see Appendix B for a description of this process and item-dimension relationships). These dimensions may be used to describe and interpret the various aspects of a job -- what dimensions are important, the behaviors of these dimensions, etc. (Mecham, 1981).

The JAPQ-D^2 score is an overall match for an individual with a specific job. This can be seen as a generalization of the 16 profile dimensions. The D^2 score is obtained by (1) converting the PAQ job analysis into a JAPQ profile (see Appendix H PAQ-JAPQ Item Conversion), (2) the difference between the individual's responses and the job profile is

squared and then multiplied by the explained variance weighting for that dimension (see Appendix B for an example of the elements, how elements fit into the dimensions, and the specific statistical weightings for each dimension), (3) these 16 scores are then summed. This summed score is the JAPQ-D^2. This score may vary from 0.00, for a perfect interest-job match and increasing upward as the person-job match becomes poorer.

The validation of the JAPQ follows the job-component basis of the PAQ. JAPQ validity is based on the item content originated in the PAQ, then using the level of each element found in that specific occupation for interest comparison (McCormick, et al., 1972). Evidence of JAPQ validity has been shown by Peterson (Note 7) in predicting student grade point average ($r = .75$ for males; $r = .60$ for females) and by Pritchard and Peters (1974) in predicting aspects of job satisfaction for Naval personnel ($r = .33$).

The reliability of the JAPQ was tested by Harris (Note 2) in his development of the Interest Analysis Questionnaire (now the JAPQ). The results of this development found test-retest coefficients of .40 to .84 with an average of .68.

Research Design

PAQ Job Analysis

The PAQ job analysts were briefed on the philosophy of the PAQ and how it would be applied in this research. The analysts then reviewed the PAQ (see Appendix A). Questions pertaining to the investigation and the job analysis were answered at this time. The analysts observed the keyer job for one month, keeping the behavioral elements of the PAQ

in mind. After this observation period each analyst completed a PAQ, independently of each other. The analysts and the research investigator met and reviewed their completed questionnaires for misinterpretations of the PAQ or differences in perception of the job itself. This final meeting proved beneficial, for there were differences in analyst opinion on both interpretation of the PAQ and job variables pertaining to behavioral aspects of the job itself (as analyzed by the PAQ). Individual item changes on their PAQ was encouraged, but not mandatory, if the analyst found a PAQ response to be an inaccurate measure of the Keyer job. The completed PAQs were accumulated and served as the data base for JAPQ comparison.

Keyer JAPQ Analysis

With the assistance of the organizations personnel staff, the employee information necessary for this study was obtained (employee output, tenure, age). The employees were then separated into one or more of the four research groups (some employees fit into two groups). Due to the restrictions placed on each research group, sample size for each group varied.

The organization's management staff notifed the Keyer supervisory staff of: The Keyer personnel selected for JAPQ participation; the dates and times for each employee to participate; and the place of the JAPQ participation (an alternate schedule was also attained for employees unavailable for the initial schedule).

The selected employees were notified, by their supervisor, that they were to assist the company with some research during the final one and one-half hours of their work shift.

During the final one and one-half hours of the selected employees work shift, the selected employees met in one of the organization's educational classrooms. The test administrator (research investigator) notified the employees:

> The company is involved in researching employee interest in performing specific types of behavior. Your job has been selected to participate in this investigation. If you prefer not to participate in this investigation, relax for the next hour until we are finished. No staff personnel will know who did or did not take a part in this investigation. I would prefer that each of you do participate. We will be here for approximately one hour, if you would like a beverage please get one now and we will begin in five minutes.

When the employees had returned, they were asked to write their name on the top of the JAPQ optical character reader (OCR) answer sheet and we would begin by going over each question one at a time (each employee also had a copy of the JAPQ). The employees were also asked to notify the test administrator of any unclear questions. The JAPQ procedures and each test question was read to the group by the test administrator (see Appendix C). There were no intervening interruptions during this time.

After all JAPQ items were completed, the JAPQs and their complementary OCR answer sheets were accumulated and grouped according to research group/s. After the grouping of OCR sheets, all employee identification was removed from the OCR sheet with the exception of markings for research grouping.

This procedure for JAPQ administration was repeated for two other shifts of employees. All employees selected were present the day of their scheduled participation and all employees chose to participate in this investigation (no alternate testing was necessary). All employees

were thanked for their participation and were notified that the results would be available upon research completion.

RESULTS

PAQ Job Analysis

The JAPQ data base was completed by averaging the seven analyst's PAQs for the job of "Keyer". The inter-rater reliability of the analysts PAQs resulted in a range of coefficients from .84 to 1.00, with an average coefficient of .91. The estimated reliability of averaged ratings equaled .98.

Individual item deviation on the PAQ analysis was minimal. Standard deviations on each PAQ item ranged from 0.00 to 1.4, with all deviations exceeding 0.5 being directional in analyst response pattern (see Appendix I for PAQ Analyst Results).

Each averaged PAQ item was correspondingly converted to a JAPQ OCR score sheet (see Appendix H for PAQ-JAPQ item conversion) and analyzed into a JAPQ 16 dimension behavioral job description by the process shown in Appendix B (for JAPQ interest comparison). This analysis conversion results in "z-scores" for each dimension.

Specific z-scores are to be interpreted as: -3.00 = a dimension which is absent in these behavioral requirements for job productivity; 0.00 = a dimension which requires a moderate amount of its specific behaviors for overall job performance; 3.00 = a dimension with specific behaviors seen as highly significant for job performance. These z-scores have a standard deviation of 1.00 and scores falling between the two extremes (-3.00 to 3.00) are to be seen along the continuum as indicated above. The complete job analysis is shown in Figure 1.

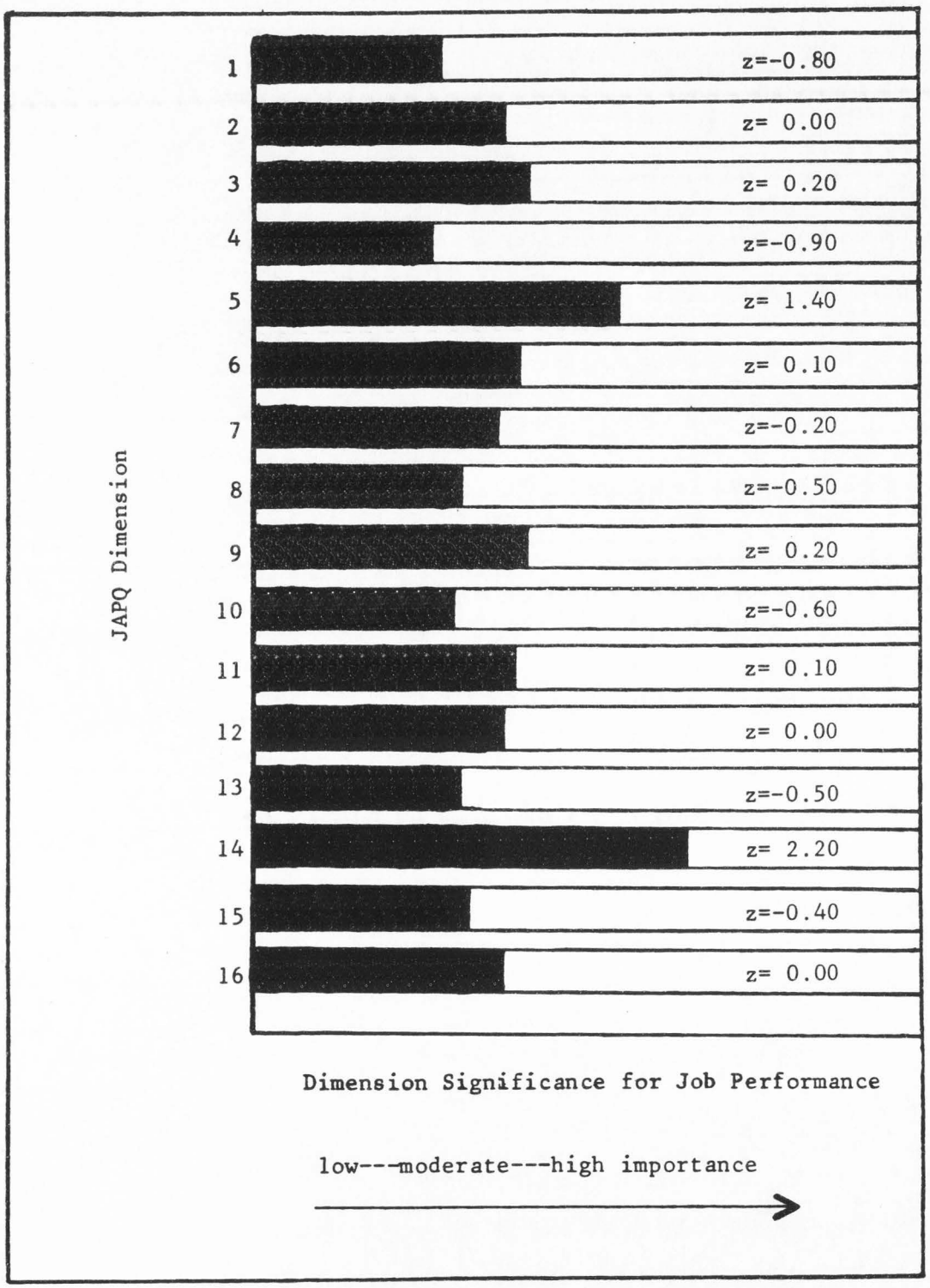

Figure 1. PAQ job analysis "keyer".

The PAQ job analysis shows dimension 14 and dimension 5 as being job behaviors which are the most significant to overall job performance. Dimension 14 pertains to the performance of paced/repetitive activities. Dimension 5 is concerned with behaviors required in the operation of keyboard and office equipment, characterized by activities and situations often found in an office environment involving clerical equipment and activities.

Dimension 3 (using machines, tools and instruments) and dimension 9 (performing supervisory duties and is also associated with job experience) are behaviors seen as moderately necessary for job performance. Dimension 6 (monitoring/controlling equipment/processes), dimension 11 (processing written information), dimension 2 (performing activities associated with the operation of vehicles), dimension 12 (working with buyers, customers, and salespersons), dimension 16 (catering, serving, smelling, and tasting), and dimension 7 (working under uncomfortable conditions) also have specific behaviors seen as somewhat necessary for job performance. Dimensions 15, 13, 8, 10, 1, and 4 are seen as dimension indicators of behaviors required only minimally, if at all, for job performance (z-scores may be elevated due to individual behavioral items within a specific dimension being modestly necessary for job performance).

A descriptive view of the PAQ results (see Appendix I) shows the "keyer" position as follows: Touch is an important non-visual source of job information (item 17). Visual sources of job information are seen with quantitative materials, visual displays, and materials not in process (items 2, 5, & 9), with considerable detail in near visual differentiation (item 20) while observing mechanical devices in use (item 7). The

activities of the body requires highly skilled body coordination (item 85). Manual activities require extensive physical handling and feeding/offbearing of light work materials (items 83, 84, & 87). The job is almost continually performed sitting in an awkward or confining work space (items 88 & 142). Repetitive activities performed at a specified and steady work pace with precision, while following set procedures, are basic job demands (items 169, 170, 172, 174). Control devices used on the job require hand/foot controls with a high aptitude in the operation of keyboard devices (items 62, 65, & 68). Finger manipulation, hand-arm manipulation, hand-arm steadiness, eye-foot coordination, and limb movement without visual control are important employee characteristics (items 93, 94, 95, 96, & 97). Hand-held devices used on the job are stationary machines or equipment (item 61). Personal contact with clerical personnel and supervisory staff are the primary means of human interaction (items 115 & 118). And, the position of "keyer" is seen as critical to the organization (item 187).

JAPQ "Keyer" Analysis

High output and low output keyers were compared by their overall JAPQ score (JAPQ-D^2). The results of this comparison are shown in Table 1. Table 1 results indicate no significant difference in the overall JAPQ score for high and low output keyer, which is confirmed by no relationship being seen when correlating JAPQ-D^2 with keyer output: $r = -.010$; $p > .05$.

Long and short tenured keyers were compared by their overall JAPQ score (JAPQ-D^2). The results of this comparison are shown in Table 2.

Table 1

JAPQ-D^2 Comparison: High vs. Low Output Keyers

	N	JAPQ-D^2	S_d	S_e
High Producing Keyers	33	6.53	3.40	0.59
Low Producing Keyers	27	6.60	3.77	0.73

t-test results: t = 0.08; df = 58; two-tailed probability = 0.94

The analysis shown in Table 2 indicates no significant difference in the overall JAPQ score for long and short tenured keyers, which is confirmed by no relationship being seen when correlating JAPQ-D^2 with keyer tenure: $r = -.199$; $p > .05$.

Table 2

JAPQ-D^2 Comparison: Long vs. Short Tenured Keyers

	N	JAPQ-D^2	S_d	S_e
Long Tenured Keyers	40	6.26	3.56	0.56
Short Tenured Keyers	20	7.16	3.51	0.78

t-test results: t = 0.93; df = 58; two-tailed probability = 0.35

The high and low output keyers had similar behavioral preferences. This similarity is seen in Table 3, which shows the relationship of JAPQ dimension preferences the employees' reported as behaviors they preferred to perform.

Table 3

Spearman Rank-Order Correlation: JAPQ Dimension Preference for High vs. Low Output Keyers

	High Output Keyer N = 33		Low Output Keyer N = 27	
JAPQ Dimension	z-score	preference rank	z-score	preference rank
1	1.17	5	1.12	6
2	0.24	10	0.36	9
3	1.02	6	1.11	7
4	-0.10	14	-0.15	13
5	0.92	7	1.14	5
6	0.01	13	0.21	11
7	-0.55	15	-0.26	14
8	1.80	1	1.46	4
9	0.58	8	0.38	8
10	0.12	13	-0.11	12
11	-1.33	16	-1.75	16
12	1.24	4	1.51	3
13	-0.74	15	-0.95	15
14	0.31	9	0.34	10
15	1.80	1	2.26	1
16	1.74	3	1.56	2

rho (p) = .962; df = 15; $p < .001$

High and low output keyers indicated a high degree of preference for job related behaviors seen in JAPQ dimensions: 15 (work involving powered water or air vehicles); 8 (characterized by a mix of items having entertainment, public content, or artistic connotations); 1 (making decisions, communicating, and having responsibility); 16 (catering, serving, smelling, and tasting); 12 (working with buyers, customers, and salespersons); and 5 (operating keyboard and office equipment). There was a moderate degree of preference for job related behaviors seen in JAPQ dimensions: 3 (behaviors associated with the use of machines, tools, or instruments); 6 (monitoring/controlling equipment/processes); 14 (performing paced/repetitive activities); 2 (behaviors or situations associated with the operation of vehicles); and 9 (responsibility, supervision, and job related experience). A low degree of preference was indicated for job related behaviors seen in JAPQ dimensions: 4 (activities involving body movement); 7 (working under uncomfortable conditions); and 10 (characterized by various estimation activities including quantity, speed, size, or time). And, a very low degree of preference was indicated for job related behaviors seen in JAPQ dimensions: 11 (processing written information) and 13 (working under hazardous conditions). The JAPQ dimension profiles displayed in Figures 2 and 3 allow for a visual comparison of the similarities between high and low output keyers.

The long and short tenured keyers responded to similar JAPQ behavioral preferences. This similarity is seen in the relationship of JAPQ dimension preferences employees reported as behaviors they preferred to perform, as shown in Table 4.

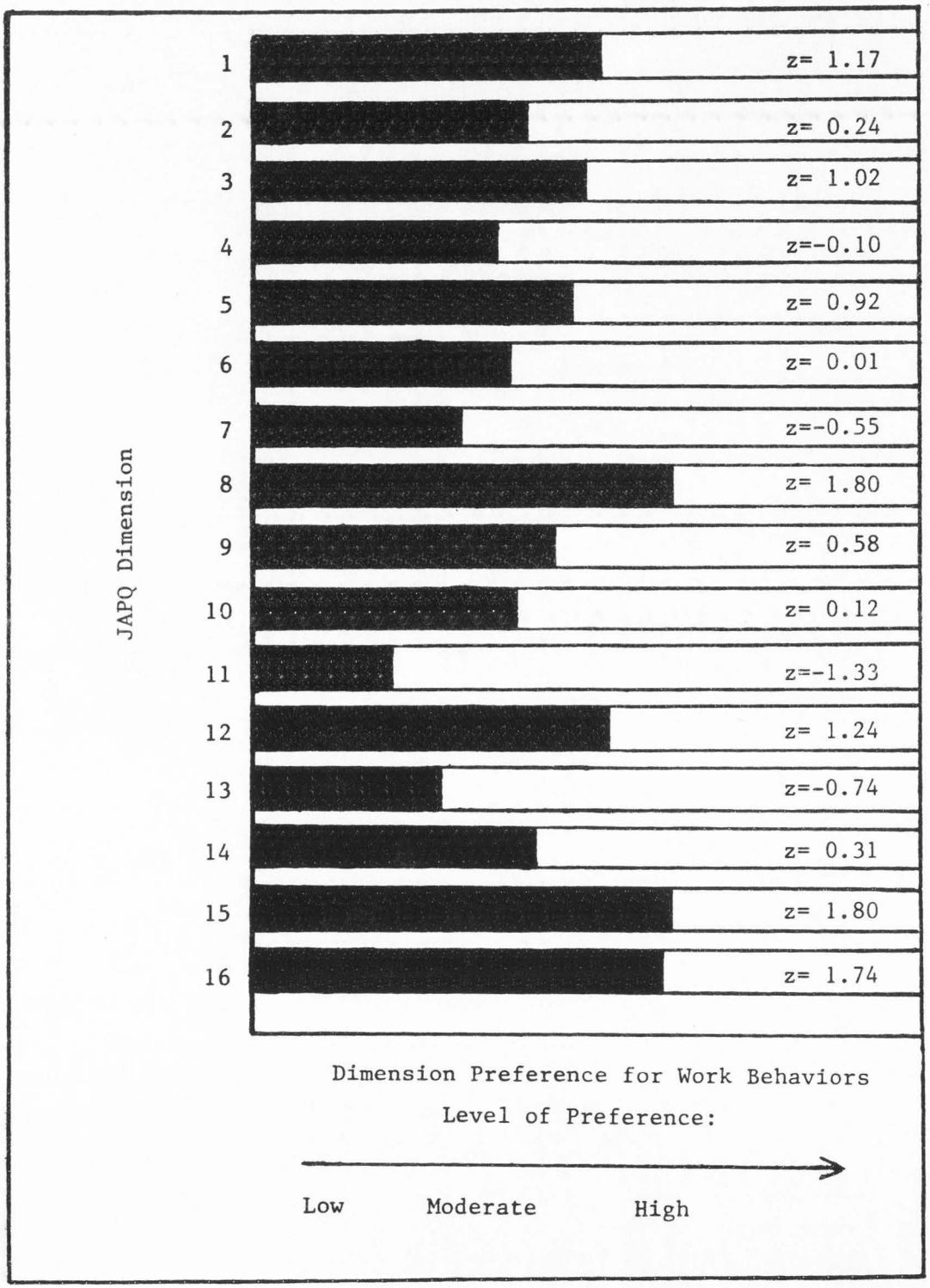

Figure 2. JAPQ dimension profile: "high output keyers".

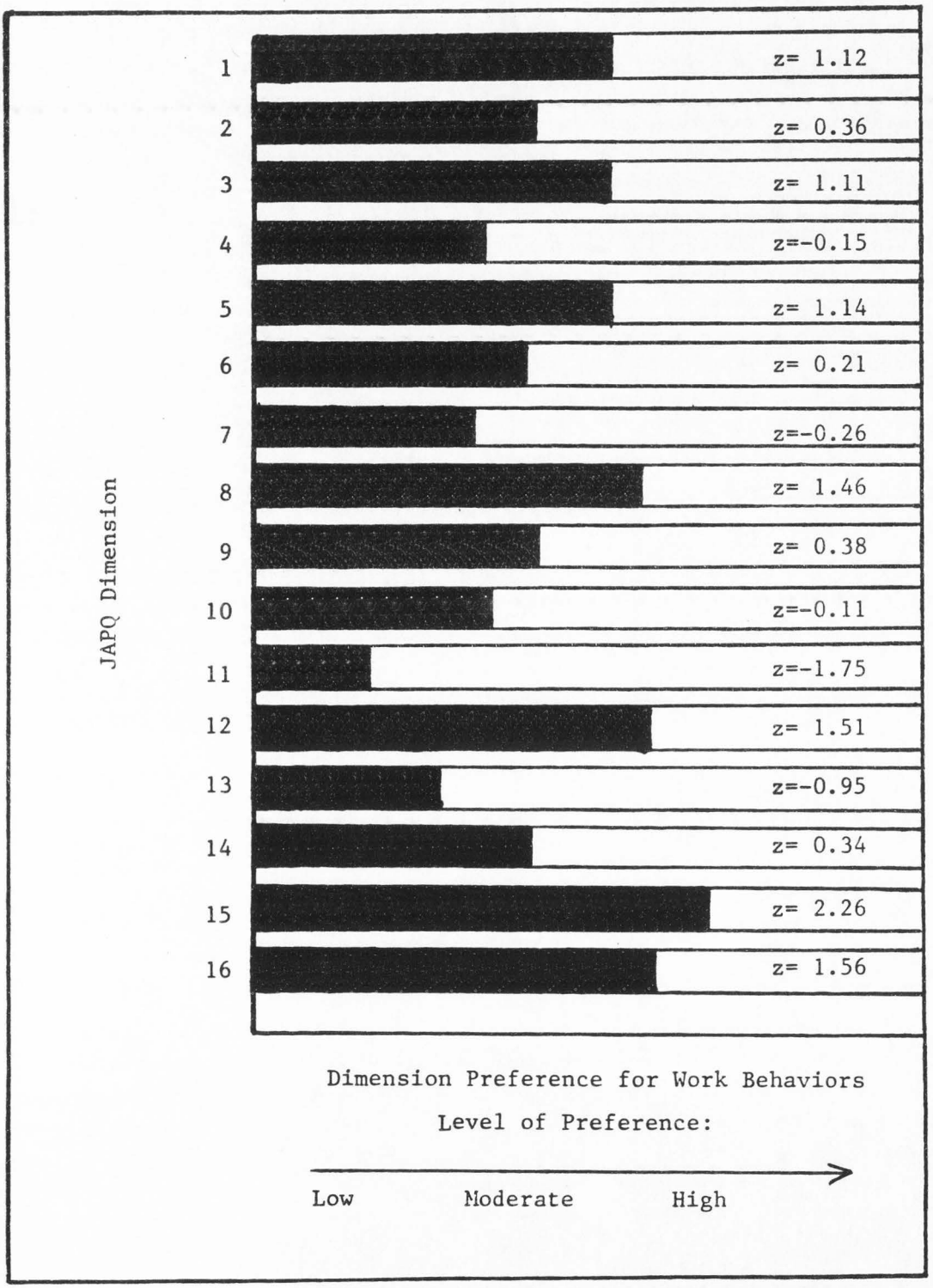

Figure 3. JAPQ dimension profile: "low output keyers".

Table 4

Spearman Rank-Order Correlation: JAPQ Dimension

Preference for Short vs. Long Tenured Keyers

	Long Tenured Keyers N = 40		Short Tenured Keyers N = 20	
JAPQ Dimension	z-score	preference rank	z-score	preference rank
1	1.09	5	1.27	5
2	0.28	9	0.33	11
3	1.01	6	1.16	7
4	-0.11	13	-0.16	13
5	0.95	7	1.16	6
6	-0.02	12	0.35	10
7	-0.44	14	-0.39	14
8	1.61	2	1.71	3
9	0.35	8	0.77	8
10	0.02	11	0.01	12
11	-1.51	16	-1.54	16
12	1.34	4	1.40	4
13	-0.95	15	-0.59	15
14	0.23	10	0.50	9
15	2.02	1	1.98	1
16	1.49	3	1.98	2

rho (p) = .979; df = 15; $p < .001$

Long and short tenured keyers indicated a high degree of preference for the job related behaviors seen in JAPQ dimensions: 15 (work involving powered water or air vehicles); 16 (catering, serving, smelling, and tasting); 8 (characterized by a mix of items having entertainment, public content, or artistic connotations); 12 (working with buyers, customers, and salespersons); 1 (making decisions, communicating, and having responsibility); 3 (behaviors associated with the use of machines, tools, or instruments); and 5 (operating keyboard and office equipment). There was a moderate degree of perference indicated for job related behaviors seen in JAPQ dimensions 9 (responsibility, supervision, and job related experience) and 14 (performing paced/repetitive activities). A low to moderate degree of preference was indicated for job related behaviors seen in JAPQ dimensions: 2 (behaviors or situations associated with the operation of vehicles); 6 (monitoring/controlling equipment/processes); 10 (characterized by various estimation activities including quantity, speed, conditions, size, or time); and 4 (activities involving body movement). And, a low degree of preference was indicated for job related behaviors seen in JAPQ dimensions: 7 (working under uncomfortable conditions); 13 (working under hazardous conditions); and 11 (processing written information).

The JAPQ dimension profiles displayed in Figures 4 and 5 allow for a visual comparison of the similarities between the long and short tenured keyers.

The relationship between keyer output and keyer tenure was examined. The results of a Pearson-Product Moment Correlation indicated no relationship with the variables of output and tenure: $r = .088$; $N = 60$; $df = 58$;

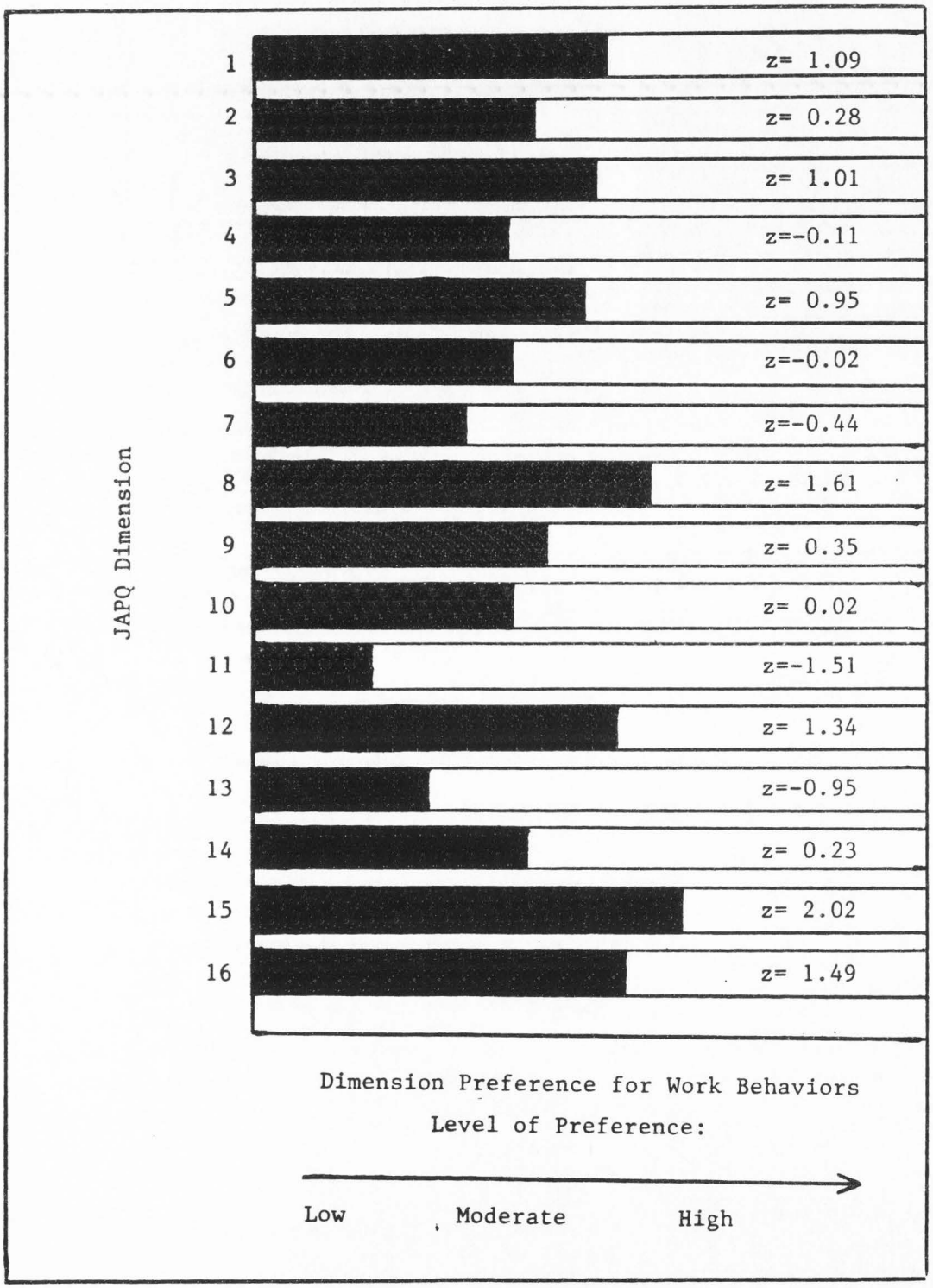

Figure 4. JAPQ dimension profile: "long tenured keyers".

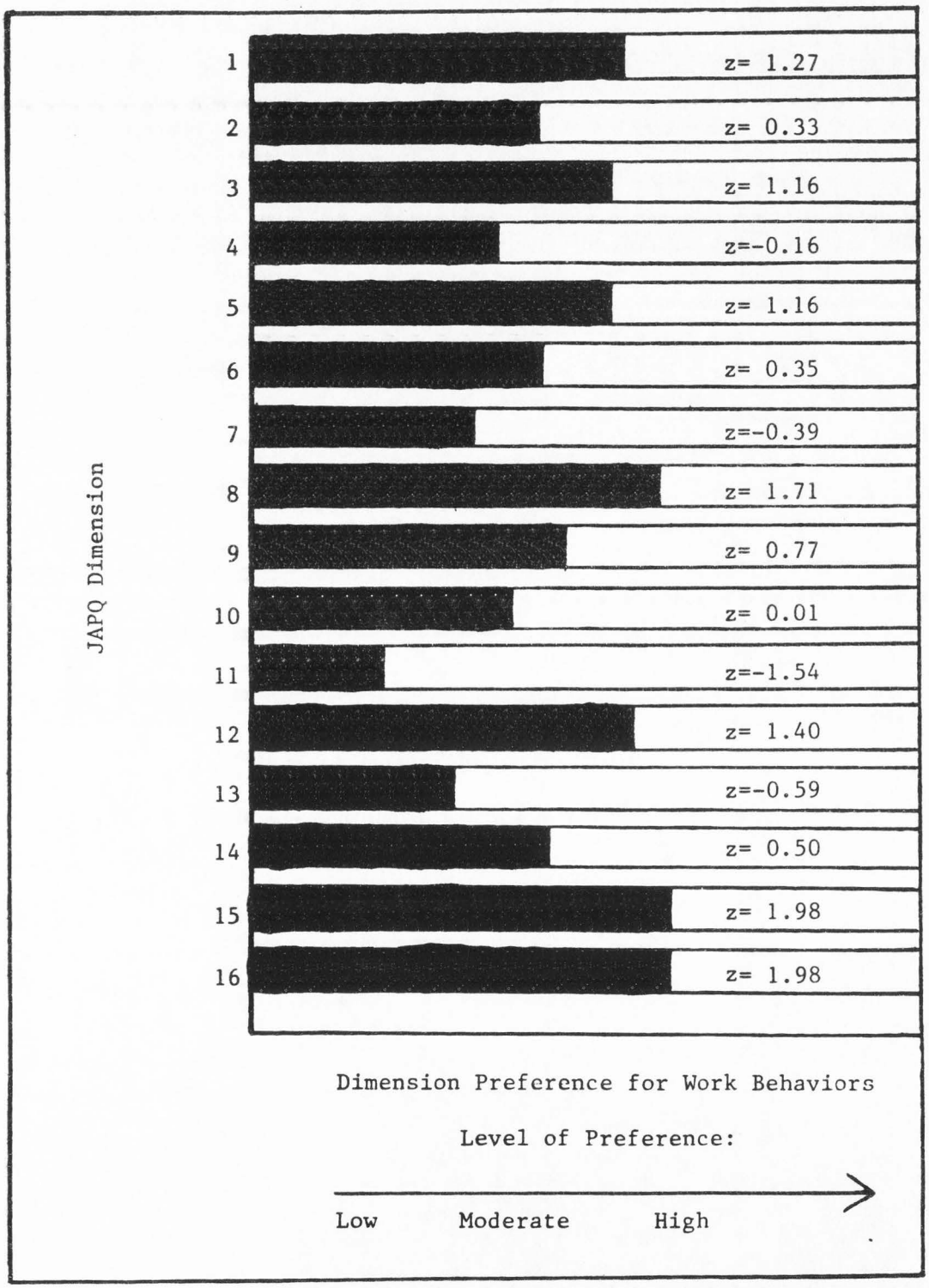

Figure 5. JAPQ dimension profile: "short tenured keyers".

$p > .05$. A closer look at the raw data revealed two employees with extensive tenure, which is highly unusual on the keyer job (refer to Appendix F). Due to this extensive tenure factor, the two employees were eliminated from the data and a second correlation was repeated with the variables of output and tenure. The second correlation resulted in a significant relationship between output and tenure: $r = .426$; $N = 58$; $df = 56$; $p < .01$.

As a means of identifying the JAPQ dimensions which best predict keyer tenure and keyer output, a step-wise multiple regression was performed with the sixty completed JAPQ^S for both tenure and for output.

The multiple regression for keyer tenure indicates significant predictive results. The dimensions used for the results found to be significant in the prediction of keyer tenure and the results of the multiple regression are shown in Table 5. The regression results indicate the best fit for predicting keyer tenure from the JAPQ is seen by incorporating: (1) a low preference level on dimension 7 ($z = -0.42$, see Appendix J for Z-scores and standard deviations), working under uncomfortable conditions; (2) a low to moderate preference level on dimension 4 ($z = -0.13$), activities involving body movement, primarily physical activities; (3) a moderate preference level on dimension 2 ($z = 0.30$), behaviors associated with the operation of vehicles; (4) a high preference level on dimension 12 ($z = 1.36$), working with buyers, customers, or salespersons; (5) A high preference level on dimension 8 ($z = 2.15$), behaviors having entertainment, public content, or artistic connotations; (6) a moderate preference level on dimension 14 ($z = 0.32$), performing paced/repetitive activities; and, (7) a moderate to high preference level on dimension 3 ($z = 1.06$), behaviors associated with the use of machines, tools, or instruments.

Table 5

Multiple Regression Results: Prediction of Keyer Tenure from JAPQ Dimensions

JAPQ Dimension*	B	BETA	Standard Error	F
7	7.288	0.372	2.579	7.984
4	-8.003	-0.218	5.022	2.539
2	9.673	0.227	5.314	3.314
12	6.077	0.226	3.624	2.812
8	-4.494	-0.174	3.244	1.919
14	-4.990	-0.150	4.079	1.497
3	-5.403	-0.174	4.674	1.336
(Constant)	31.3027			

		DF	SS	MS
Multiple R = 0.533	Regression =	7;	11111.46;	1587.35
Adjusted R = 0.433	Residual =	52;	28046.19;	539.35
Adjusted R^2 = 0.187	F = 2.943			
Standard Error = 23.224				
$p < .001$	$p < .01$			

*Dimension descriptions are found in Appendix A.

The results of the multiple regression for the prediction of keyer output also indicated significant predictability. The dimensions used for the results found to be significant in the prediction of keyer output and the results of the multiple regression are shown in Table 6. The regression results indicate the best fit for predicting keyer output from the JAPQ is seen by incorporating: (1) A moderate to high preference

Table 6

Multiple Regression Results: Prediction of Keyer Output from JAPQ Dimensions

JAPQ Dimension*	B	BETA	Standard Error	F
5	-48.465	-0.207	30.915	2.458
8	24.739	0.148	21.702	1.299
10	35.394	0.189	23.700	2.230
1	52.601	0.208	34.937	2.267
11	42.981	0.199	30.358	2.005
2	-46.831	-0.170	36.346	1.660
(Constant)	890.469			

Multiple R = 0.450		DF	SS	MS
Adjusted R = 0.335	Regression =	6;	331842.170;	55307.028
Adjusted R^2 = 0.113	Residual =	53;	1304737.480;	24617.688
Standard Error = 156.90	F = 2.247			
$p < .01$	$p < .05$			

*Dimension descriptions are found in Appendix A.

level on dimension 5 (z = 1.02), operating keyboard and office equipment. (2) A high preference level on dimension 8 (z = 1.65), behaviors having entertainment, public content, or artistic connotations. (3) A moderate preference level on dimension 10 (z = 0.02), behaviors characterized by various estimation activities including quantity, speed, conditions, size, or time. (4) A high preference level on dimension 1 (z = 1.15), making decisions, communicating, and having responsibility. (5) A low

preference level on dimension 11 ($z = -1.52$), processing written information. And, (6) a moderate preference level on dimension 2 ($z = 0.30$), behaviors associated with the operation of vehicles.

DISCUSSION

PAQ Job Analysis

When viewing the overall job analysis, as shown in Figure 1, it may appear that certain dimensions are not reflective of the behavioral requirements for the keyers' job. This is likely to be reached when one makes a judgment based on the general dimension descriptors, and fails to take into account the basic behaviors required in the performance of such descriptors. Dimensions 12 and 16 are two dimensions, in this study, where this type of a gross misinterpretation may occur. Dimension 12 is briefly described as "working with buyers, customers, and salespersons," which are not a function of the keyer job. But, the communicative behaviors necessary in working with people are a function of this job (e.g., communicating with supervisors and other clerical personnel and following set procedures). Dimension 16 is briefly described as "catering, serving, smelling, and tasting." Again, these general behaviors are not a function in keyer job performance, but the physical behaviors of finger manipulation, hand-arm steadiness, hand-arm manipulation, highly skilled body coordination, physically handling of work being performed, and limb movement without visual control are behaviors necessary for an individual to perform the job of the keyer.

The keyer job, as described by the PAQ results (refer to Chapter 4) appears to be an accurate behavioral measurement of this job, which was briefly described by the organization as: Keying financial information (numerics) on a "ten-key" from handwritten documents into a CRT

terminal. Such an analysis will tend to allow for valid PAQ-JAPQ comparisons.

JAPQ Results

The objectives of this study were focused on the differences between or similarities with (1) long vs. short tenured keyers and (2) high vs. low output keyers, in respect to (A) their JAPQ-D^2 score and (B) how the JAPQ dimensions were preferred by keyers as behaviors they were interested in as a function of their work. The relationship between tenure and output was also looked into, as well as the application of the JAPQ in predicting keyer output and keyer tenure.

High and low output keyers are seen as being similar in their overall preferences for performing specific work behaviors. This similarity is indicated in the similarity of their JAPQ-D^2 scores and is further confirmed by the finding of no relationship between keyer output and JAPQ-D^2 score. Such a finding would tend to indicate reliability in the hiring practices of this organization's personnel office, as seen in the hiring of individuals with similar preferences for performing specific work behaviors and assuming that there is parity in their aptitude to perform such work.

When viewing the differences between the critical job dimensions, as indicated by the PAQ analysis, and the "output" keyers JAPQ interests in performing such work related behaviors (see Table 5), dimension 14 stands out. This indicates that performing paced/repetitive activities is a very important behavior in functioning as a keyer. The keyers preference for performing this type of activity is seen as "moderate", implying

that the keyers will perform paced/repetitive activities, but would prefer another activity over this one.

The dimension profiles for high and low output keyers (refer to Table 3) reveal similar work behavior preferences, as indicated by a

Table 7

"Output" Keyers vs. PAQ Job Analysis: Z-Score Comparison

JAPQ Dimension	PAQ Analysis	High Output Keyers	Low Output Keyers
1	-0.80	1.17	1.12
2	0.00	0.24	0.36
3	0.20	1.02	1.11
4	-0.90	-0.10	-0.15
5	1.40	-0.92	1.14
6	0.10	0.01	0.21
7	-0.20	-0.55	-0.26
8	-0.50	1.80	1.46
9	0.20	0.58	0.38
10	-0.60	0.12	-0.11
11	0.10	-1.33	-1.75
12	0.00	1.24	1.51
13	-0.50	-0.74	-0.95
14	2.20	0.31	0.34
15	-0.40	1.80	2.26
16	0.00	1.74	1.56

concordant ranking of JAPQ behavior dimensions with these two groups of keyers. This finding indicates that JAPQ-D^2 scores are similar and any differences in "output" keyers' preference for work behaviors are yet to be found at the JAPQ dimension level.

Long and short tenured keyers* are also seen as being similar in their overall preferences for performing specific work behaviors, as indicated by similar JAPQ-D^2 scores and was further confirmed by the finding of no relationship between JAPQ-D^2 score and keyer tenure. This finding tends to further establish the reliability of the organization's hiring of individuals with similar preferences for performing specific work behaviors, again assuming the parity in aptitude to perform such behaviors necessary for job performance.

The results on critical "keyer" work dimension 14 (see Table 6) and the "tenured" keyers' preference for performing such behaviors are similar to those found with "output" keyers. It appears that all keyers will perform paced/repetitive activities, but would prefer other work activities over this one.

The dimension profiles for long and short tenured keyers also demonstrate similarity in their preference ranking (refer to Table 4). Again indicating that JAPQ-D^2 scores are similar and any differences in "tenured" keyers' preference for work behaviors will not be found at the

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*There is a possibility of an extraneous variable being present within the short tenured keyer group, which is not possible to account for in this study. This is a maturation variable (Campbell & Stanley, 1963) which will occur when short tenured keyers exceed sixteen months on the job as a keyer, which would alter their tenure grouping. For this study, a keyer with less than seventeen months of continuous tenure is viewed as a "short-tenured" keyer.

Table 8

"Tenure" Keyers vs. PAQ Job Analysis: Z-Score Comparison

JAPQ Dimension	PAQ Analysis	Long Tenure Keyers	Short Tenure Keyers
1	-0.80	1.09	1.27
2	0.00	0.28	0.33
3	0.20	1.01	1.16
4	-0.90	-0.11	-0.16
5	1.40	0.95	1.16
6	0.10	-0.02	0.35
7	-0.20	-0.44	-0.39
8	-0.50	1.61	1.71
9	0.20	0.35	0.77
10	-0.60	0.02	0.01
11	0.10	-1.51	-1.54
12	0.00	1.34	1.40
13	-0.50	-0.95	-0.59
14	2.20	0.23	0.50
15	-0.40	2.02	1.98
16	0.00	1.49	1.98

JAPQ dimension level. The differences between the long and short tenured keyers on the dimensions were minimal.

The dissonance between keyer work dimensions and the keyer's preference for performing the behaviors on these dimensions remains a

possible aspect in considering indicators pertaining to the high rate of turnover on this job.

A general overview of the comparison with the PAQ dimensions analysis and the keyers' preference for performing the behaviors indicated in each dimensions shows (refer to Appendix K and Tables 5 and 6):

Dimension 1. Decision making, analyzing, communicating, and responsibility are of minimal importance for the keyer's work. In contrast, all keyers indicate a moderate to strong preference for performing these behaviors.

Dimension 2. The keyer analysis and the keyers indicate a similar low to moderate preference/need for performing behaviors associated with the operation of vehicles.

Dimension 3. The keyer analysis views the behaviors associated with using machines, tools, and instruments as being of low to moderate importance. The keyers indicated a moderate to strong preference in this area.

Dimension 4. The keyers indicate a moderate to strong preference for performing physical activities. The PAQ analysis views these behaviors as being minimal for keyer job performance.

Dimension 5. The operation of keyboard and office equipment is seen as a very important aspect of the keyer job. A similar preference in this area was seen with the keyers.

Dimension 6. The PAQ analysis and the keyers see performing the behaviors characterized by the sensing of information used to monitor or control equipment or processes as being of low to moderate in work importance/preference.

Dimension 7. The PAQ analysis indicates that the keyer job is performed in a comfortable environment and the keyers also prefer to work under such conditions.

Dimension 8. The PAQ analysis shows behaviors related to entertaining, public speaking, and with artistic connotations are not related to functioning as a keyer. The keyers have a contrasting view, indicating a strong preference in this area.

Dimension 9. Performing supervisory duties is seen on the job analysis as a moderate function of the job. The keyers indicated a similar preference.

Dimension 10. Performing estimating activities is a low to minimal aspect of the keyer job. The keyers indicated a moderate degree of preference in performing these behaviors.

Dimension 11. Processing written information is seen being moderately important to keyer functioning. The keyers indicate only a minimal preference in performing these behaviors.

Dimension 12. Working with buyers, customers, and sales-persons is of low to minimal importance on the keyer job. But, the key-ers indicate a strong interest in performing these behaviors.

Dimension 13. Working under hazardous conditions is not a function of the keyer job and the keyers have no preference to perform under such conditions.

Dimension 14. Performing paced or repetitive activities is a very important aspect in functioning as a keyer. The keyers indicate a moderate preference for performing these behaviors.

Dimension 15. The behaviors associated with working with aerial and aquatic are seen as minimally important in keyer functioning. But, the keyers strongly prefer to perform these behaviors.

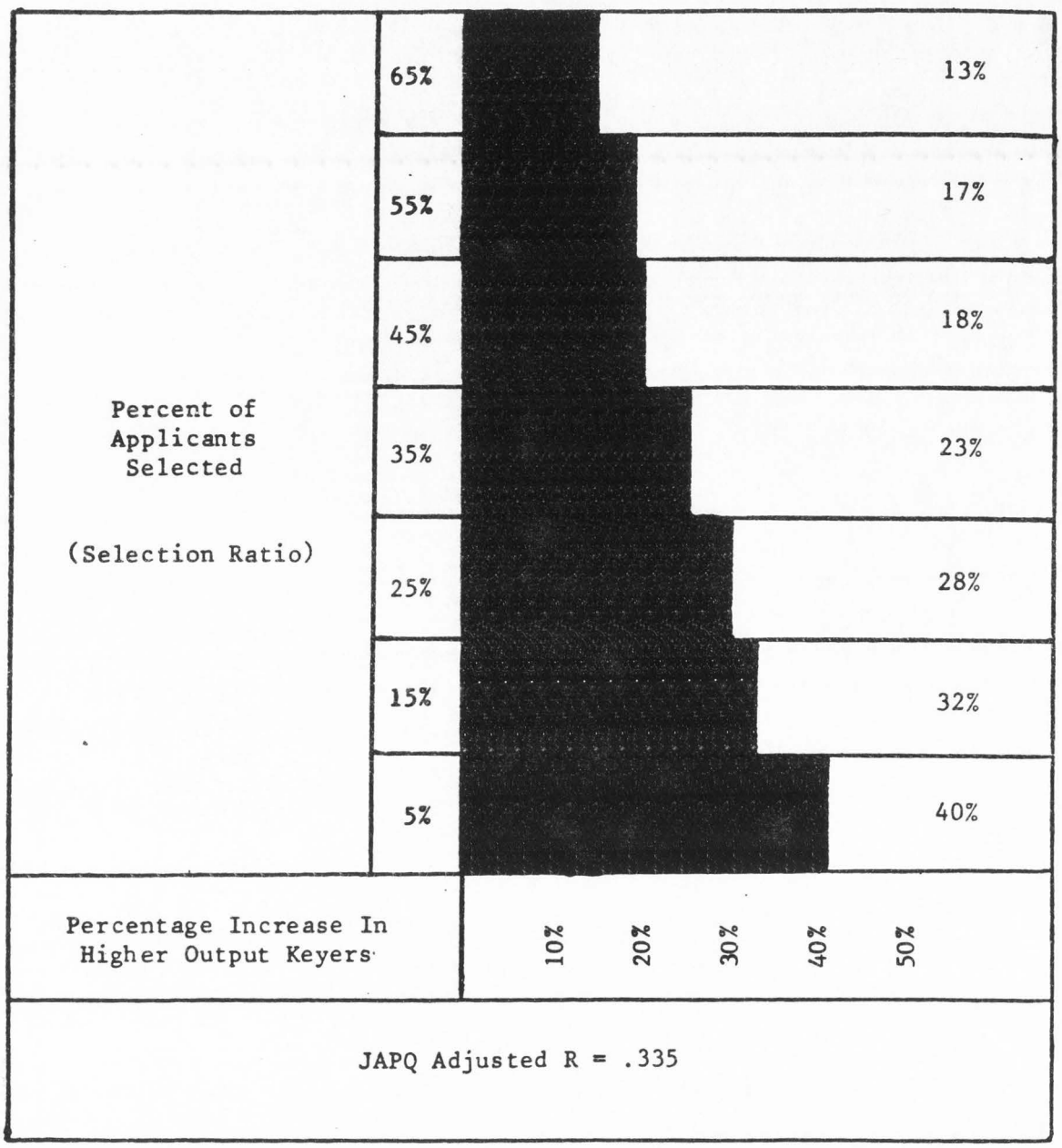
Dimension 16. The behaviors associated with the preparation of food are seen as a moderate function of the keyer's work (primarily the physical movement associated with both areas). By contrast, the keyers indicate a strong preference for performing these behaviors.

The dissonant findings between keyer work dimensions and keyer preference for performing these behaviors (dimension 1, 3, 4, 8, 11, 12, 14, 15, and 16) may be an indicator of job dissatisfaction. As suggested by Melamed and Meir (1981), the level of congruence in an individual's interest in performing job behaviors is directly related to job satisfaction. This incongruence with the keyers' preference for performing "keyer" work behaviors may be one employee aspect which directly impacts the turnover rate on the keyer job. But, further data analysis would be necessary to accurately make this statement.

There was no relationship found between keyer tenure and keyer output. When viewing the individual keyer data (refer to Appendix F) two keyers with extreme tenure and below average output, stood out, skewing the data. (The employer also indicated that such extensive tenure was very unusual.) The data for these two keyers was deleted and a second analysis indicated a positive relationship between keyer tenure and keyer output. Keyer output tends to increase correspondingly with keyer tenure and then decreases as tenure becomes extreme. This finding appears to follow the change in human characteristics seen by Fleishman (1966) and Chown and Heron (1965): With time, performance on a given task increases as skills specific to the task become habitual. But, in time the aging process of the human body will show a decline in motor coordination and speed and skills using such motor behavior will also decline. The keyers' employer would likely absorb the loss of employee output for the profitable gain seen with less hiring and training of new personnel. For this reason, the findings related to increasing tenure are important.

The regression results* indicate that use of the JAPQ as a pre-employee selection screen may prove beneficial as one of the measures in the hiring process for keyers. Figure 6 shows the probable percentages of attaining "higher output" keyers by utilizing the information given in Table 6 and Appendix J. The organization's personnel office indicated that the current selection ratio for the keyer job is 45/100. By using a pre-selection JAPQ response profile, incorporated with the present employee selection indices, an increase of of 18% in higher output keyers

*Due to the research sample being non-reflective of the keyer population, multiple regression results need to be viewed with caution. A true population sample may result in lower correlations, which would also lower the percentage of predictability when using the JAPQ.



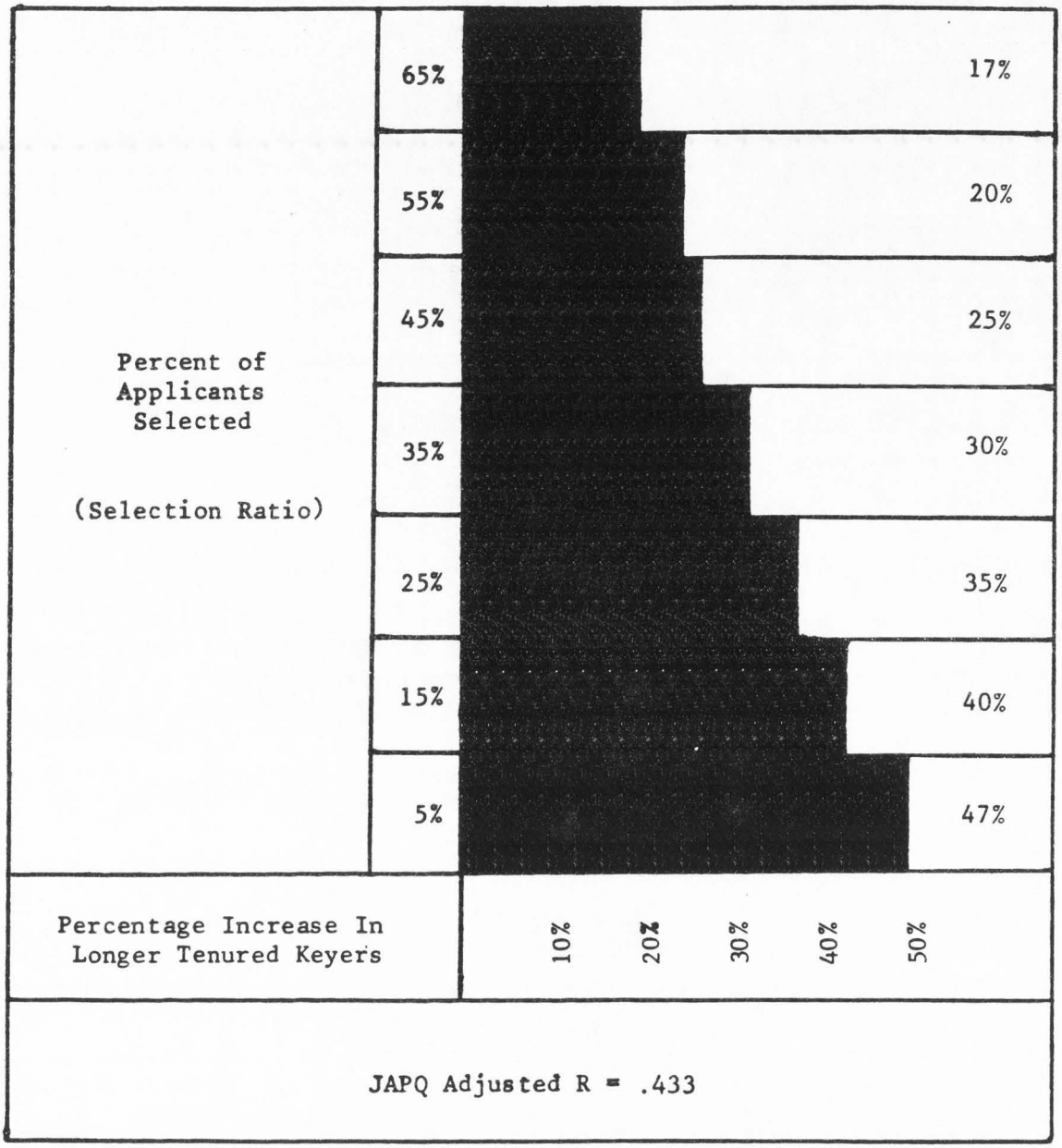
Source: Taylor & Russell, 1939.

Figure 6. Expectancy of increase in higher output keyers through use of the JAPQ as a pre-employment screen.

could be seen. The JAPQ profile for these persons would be a moderate to high preference for operating keyboard and office equipment (dimension 5); a moderate to very high preference for behaviors having entertainment, public content, or artistic connotations (dimension 8); a moderate preference for making decisions, communicating, and having responsibility) dimension 4); a very low preference for processing written information (dimension 11); and a moderate preference for behaviors associated with the operation of vehicles (dimension 2).

This approach to employee screening would raise the criterion for employment to attain an increase in higher output keyers, as well as lower the selection ratio which would increase the expected percentage of higher output keyers. The rise in criterion has a trade-off for the increase in probability of new hires being high producers: a secondary increase in high producers "not" being hired, due to traits unidentified by the criterion measures and the lowering of the selection ratio (false negatives).

The regression results also indicate that the use of the JAPQ as a pre-employee selection screen could prove beneficial for the hiring of longer tenured exployees, when incorporated into the organization's present battery of personnel selection measures. Figure 7 shows the probable percentages of attaining "longer tenured" keyers by utilizing the information given in Table 5 and Appendix J. By using the organization's current selection ratio of 45/100, an increase of 25% in longer tenured keyers could be seen by including the JAPQ into the screening of potential keyers. The JAPQ profile for these individuals would be a low preference for working under uncomfortable conditions (dimension 7); a low to moderate preference for performing physical activities (dimension



Source: Taylor & Russell, 1939.

Figure 7. Expectancy of increase in longer tenured keyers through use of the JAPQ as a pre-employment screen.

4); a moderate preference for performing the behaviors associated with the operation of vehicles (dimension 2); a moderate to very high preference for working with buyers, customers, or salespersons (dimension 12); a moderate to very high preference for behaviors having entertainment, public content, or artistic connotations (dimension 8); a moderate preference for performing paced or repetitive activities (dimension 14); and a moderate to high pereference for performing behaviors associated with the use of machines, tools, or instruments (dimension 3).

This pre-employee screen would again raise the criterion for selection to attain an expected increase in employee tenure on the keyer job. The probability of also attaining a rise in false negative "not hires" is again likely to increase. With this raise in criterion, the organization's selection ratio would tend to increase the percentage in tenured keyers (see Figure 7). The extent of the expected increase in tenure will directly correspond with the change in the organization's selection ratio. This process appears to be in the direction of filling portions of Guion's (1976) ultimate personnel policy of hiring individuals who are productive, dependable, and likely to stay, (at least to the extent of increasing the probability of hiring individuals who are likely to remain as keyers or are more productive).

Recommendations for further research should begin by stressing the need for an extensive PAQ job analysis. Such an analysis will tend to overcome the "human" traits which may lower PAQ inter-rater reliability. The process for job analysis used in this investigation (see Research Design: PAQ Analysis) appears to have subsided the concerns mentioned by Smith and Hakel (1979) pertaining to inter-rater reliability. The combined PAQ analysts' review of the completed PAQs appears to have

played a major role in maintaining inter-rater reliability, which also implies a more valid data base for JAPQ comparison.

It would have been beneficial to have obtained a complete workforce sample. When the sample is reflective of a complete concurrent population, it should carry over to the personnel office in making more accurate predictions when using the JAPQ as a pre-employment screen (this need is indicated from the caution seen in interpreting the multiple regression analysis).

The major suggestion for any research utilizing a PAQ-JAPQ method is to complete an "item analysis," as well as a dimension analysis. The dimension analysis in this investigation proved highly promising, but an item analysis (individual item analysis) of the employees' JAPQs may have broken down the JAPQ into critical behavior items (as seen with the descriptive view of the PAQ analysis), which may be necessary to find differences with such a homogeneous sample. Further evaluation of the data in this study by an item analysis may indicate employee differences where they are not found with the general JAPQ-D^2 analysis and the dimension analysis.

An area which is in need of research is in the area of a longitudinal study. Following subjects from the pre-employment status through specific types of job changes, terminations, etc., would result in numerous profiles concurrent with that organization's personnel (e.g., a long tenured keyer or a high output keyer who is promoted into other organizational positions). A secondary benefit from such an investigation would be a better understanding of the employee in general.

Further analysis of the data used in this study could follow the need of an item analysis. One potentially promising question is seen in the two employee's with extensive tenure: How do they differ from the rest of the keyers?

Any relevant research utilizing the PAQ-JAPQ approach will assist the process of opening up the doors to objective testing in the personnel office. The area of personnel testing has been virtually closed, due to the stringent (but necessary) guidelines set by the EEOC. The application of this type of research appears to meet EEOC guidelines for selection testing, which can allow for more valid employee selection decisions through the use of objective testing instruments.

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APPENDICES

Appendix A

PAQ

POSITION ANALYSIS QUESTIONNAIRE

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INTRODUCTION

The Position Analysis Questionnaire (PAQ) is a structured job analysis questionnaire that can be used for analyzing positions or jobs of many different types. On the base of the analysis of any give position/job with the PAQ it is possible to compute statistically-derived job dimension scores, thus making it possible to relate positions or jobs to each other on the basis of such job dimension scores.

ORGANIZATION OF THE QUESTIONNAIRE

The questionnaire is divided into the six major divisions listed below. In addition to the division titles, a "question" is included which can be kept in mind when going through each division.

Divisions:

1. *Information Input* (Where and how does the worker get the information that is used in performing the job?) Pages 4-7
2. *Mental Processes* (What reasoning, decision-making, planning, and information processing activities are involved in performing the job?) Pages 7-10
3. *Work Output* (What physical activities does the worker perform and what tools or devices are used?) Pages 11-15
4. *Relationships With Other Persons* (What relationships with other people are required in performing the job?) Pages 16-20
5. *Job Context* (In what physical and social contexts is the work performed?) Pages 20-23
6. *Other Job Characteristics* (What activities, conditions, or characteristics other than those described above are relevant to the job?) Pages 23-28

The six divisions that are listed above are further divided into sections and subsections. Each section or subsection is made up of a group of related job elements (in the questionnaire these are referred to as "items"). Each job element describes some *general* work activity, work condition, or job characteristic. In most cases examples are given to illustrate the "central idea" of the job element. However, these examples are intended *only* to help illustrate the idea and represent only a *few* of the possible examples that could characterize the job element.

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RATING SCALES FOR JOB ELEMENTS

For each job element, provision is made for using a "rating scale" as the element applies to any given position/job. Several different rating scales are used throughout the questionnaire and are located on those pages to which they pertain, or on preceding pages. In general they look like this:

Code	*Extent of Use (U)*
N	Does not apply
1	Nominal/very infrequent
2	Occasional
3	Moderate
4	Considerable
5	Very substantial

or

Code	*Applicability (A)*
N	Does not apply
1	Does apply

At the beginning of each job element you will find a capital letter indicating the "scale" to be used for the element. For example, the entry for the first job element (no. 1) looks like this: 1U _____ . The "U" refers to the "Extent of Use (U)" rating scale which is shown above. Rating scales are marked with the letters which follow:

Letter	*Rating Scale*
U	Extent of Use (shown above)
T	Amount of Time
I	Importance to the Job
P	Possibility of Occurrence
A	Applicability (shown above)
S	Special Code (When this code is used, it applies only to the job element of which it is a part.) Note that some "Special (S)" rating scales do *not* have an N (Does not apply) answer because the statement applies in some degree to every job.

Caution: For each job element use *only* the rating scale identified by the capital letter in front of it.

INSTRUCTIONS FOR JOB ANALYSTS

The person who is to analyze any position/job (the job analyst) should first become familiar with the PAQ (including its organization and job elements) and the various rating scales that are used with the individual job elements. The job analyst preferably should be someone who is already acquainted with the particular position/job to be analyzed. if this is not the case he/she should become familiar with it by interviewing the job incumbent and possibly by observing the job being performed. During the interview with the incumbent the job analyst should elicit the information necessary to rate each job element. In doing so, the analyst normally should proceed systematically through the various sections of the PAQ, beginning with general questions relating to each section, and then asking more specific questions relating to the individual job elements. The analyst should always be sure to consider each job element as it might relate to the position/job.

In the rating of any given job element the analyst should select the rating scale value which is considered to be most appropriate for the position/job, considering the *concept* reflected by the job element itself, and the type of *rating scale* that is provided for use with that job element. The examples given for many job elements in the PAQ are intended to be *only* illustrative of the concept of the job element, and *not* as being indicative of the complete range of possible content. The analyst should interpret the "content" of any job element as it relates to the position being analyzed. In the case of any position/job there will of course be many job elements that do not apply. In such instances simply mark N (Does not apply). (Formerly DNA).

Use the open-ended job elements (44, 60, 127, 181) *only* when that which they describe clearly falls outside the realm of the other elements.

RECORDING OF IDENTIFICATION INFORMATION AND RATINGS

In the analysis of positions/jobs with the PAQ it is the usual practice to record the results of the analysis on a PAQ Record Form designed for optical scanning. In the use of that record form use only a *pencil* (preferably no. 2). If corrections are made, erase completely. Limit marks to the spaces provided, and do not fold the form. In recording the identification information on the record form follow the instructions for Steps 1 and 2.

Step 1. Print the Information Below (using spaces provided on record form):
Name of Incumbent
Analyst Type (check one of the boxes)
Job Description (describe each job concisely but with enough detail about the job duties to allow the assigment of a job code).

Step 2. Enter Identification Information (identification of position/job): Print identification in boxes provided. Enter only one letter, number or punctuation mark in each box. Print in sequence beginning at left; abbreviate where necessary; ORGANIZATION*JOB TITLE*DEPARTMENT OR UNIT*DATE*ANALYST'S NAME. Enter asterisk (*) between items of information. For missing item leave blank box between asterisks as follows: [*][*]. Leave blank box between words. For the entry in each box blacken the corresponding letter, number, or symbol in the space below the box.

Step 3. Enter Responses to PAQ Items (reverse side of record form): For each job element use the rating scale that is indicated by the letter next to the element (U, I, T, P, A, or S). After deciding what response to make for each job element blacken competely the corresponding space. Special Note Regarding Pay/Income (items 188-194):

1. Indiate if each method of receiving pay/income does or does not apply.
2. If there are two or more people on the job, determine the most representative monthly compensation rate (the "middle" or median value). Enter this rate (nearest $, £, etc.) in the vertical boxes in the lower right hand corner, and then blacken the corresponding spaces. To compute *monthly* values from those based on hours, weeks, or years multiply by the appropriate number as follows: hr. (173.33); wk. (4.33); 2-wk. (2.17): yr. (.83).

Review of Record Form
Review your responses to see that all identification information is provided, and that there is a response for every job element.

Instructions Regarding Ratings of Scale Mid-points
The PAQ Record Forms starting with No. 125,001 provide for rating job elements at mid-points between the N, 1, 2, 3, 4, and 5 scale positions. These record forms have a ".5" scale position *after* the "5" scale position. When assigning a rating at a mid-point (such as 2.5) mark *both* the *whole scale* value (such as 2) *and* the *mid-point* value (.5).

Instructions Regarding Sex and Ethnic Characteristics of Job Incumbents
In addition, the PAQ Record Forms starting with No. 125,001 provide for reporting information about the incumbents for each job in terms of sex and ethnic characteristics. Further instructions regarding this are on page 20 of the PAQ Job Analysis Manual (1977). (This page is available as a supplement to the Job Analysis Manual as it was originally published, but is included in copies distributed after September 1979.)

INFORMATION INPUT

1 INFORMATION INPUT

1.1 Sources of Job Information

Rate each of the following items in terms of the extent to which it is used by the worker as a source of information in performing the job.

Code	*Extent of Use (U)*
N	Does not apply
1	Nominal/very infrequent
2	Occasional
3	Moderate
4	Considerable
5	Very substantial

1.1.1 Visual Sources of Job Information

1 U Written materials (books, reports, office notes, articles, job instructions, signs, etc.)

2 U Quantitative materials (materials which deal with quantities or amounts, such as graphs, accounts, specifications, tables of numbers, etc.)

3 U Pictorial materials (pictures or picturelike materials used as *sources* of information, for example, drawings, blueprints, diagrams, maps, tracings, photographic films, x-ray films, TV pictures, etc.)

4 U Patterns/related devices (templates, stencils, patterns, etc., used as *sources* of information when *observed* during use; do *not* include here materials described in item 3 above)

5 U Visual displays (dials, gauges, signal lights, radarscopes, speedometers, clocks, etc.)

6 U Measuring devices (rules, calipers, tire pressure gauges, scales, thickness gauges, pipettes, thermometers, protractors, etc., used to obtain visual information about physical measurements; do *not* include here devices described in item 5 above)

7 U Mechanical devices (tools, equipment, machinery, and other mechanical devices which are *sources* of information when *observed* during use or operation)

8 U Materials in process (parts, materials, objects, etc., which are *sources* of information when being modified, worked on, or otherwise processed, such as bread dough being mixed, workpiece being turned in a lathe, fabric being cut, shoe being resoled, etc.)

9 U Materials *not* in process (parts, materials, objects, etc., not in the process of being changed or modified, which are *sources* of information when being inspected, handled, packaged, distributed, or selected, etc., such as items or materials in inventory, storage, or distribution channels, items being inspected, etc.)

10 U Features of nature (landscapes, fields, geological samples, vegetation, cloud formations, and other features of nature which are observed or inspected to provide information)

11 U "Man-made" features of environment (structures, buildings, dams, highways, bridges, docks, railroads, and other "man-made" or altered aspects of the indoor or outdoor environment which are *observed* or *inspected* to provide job information; do not consider equipment, machines, etc., that individuals use in their work, as covered by item 7)

12 U Behavior (observing the actions of people or animals, for example, in teaching, supervising, sports officiating, etc., where this *behavior* is a source of job information

13 U Events or circumstances (events the worker *visually* observes and in which he/she may participate, such as flow of traffic, movement of materials, airport control tower operations, etc.)

14 U Art or decor (artistic or decorative objects or arrangements used as *sources* of job information, for example, paintings, sculpture, jewelry, window displays, interior decoration, etc.)

1.1.2 Nonvisual Sources of Job Information

15 U Verbal sources (verbal instructions, orders, requests, conversations, interviews, discussions, formal meetings, etc.; consider only verbal comunication which is relevant to job performance)

16 U Nonverbal sounds (for example, noises, engine sounds, sonar, whistles, musical instruments, signals, horns, etc.)

17 U Touch (pressure, pain, temperature, moisture, etc.; for example, feeling texture of surface, etc.)

18 U Odor (odors which the worker *needs* to smell in order to perform the job; do *not* include odors simply because they happen to exist in the work environment)

19 U Taste (bitter, sour, sweet, or salty qualities which are *sources* of job information, for example, wine taster, candy taster, etc.)

1.2 Sensory and Perceptual Processes

20 S Near-visual differentiation (using the code below, rate the amount of detail the worker must see to adequately obtain job information from objects, events, features, etc. *within arm's reach*)

Code	*Degree of Detail*
N	Does not apply (worker is blind or works in total darkness)
1	Very little detail (for example, that required in moving boxes, dumping trash, opening desk drawers, etc.)
2	Limited detail (for example, that required in bagging groceries, taking tickets, grinding hamburger, etc.
3	Moderate detail (for example, that required in hammering nails, reading typed letters, reading dials and guages, etc.)
4	Considerable detail (for example, reading small legal print, setting ignition points, etc.)
5	Extreme detail (for example, that required in diamond cutting, repairing watches, assembling small electrical transistors, etc.)

INFORMATION INPUT

Note on rating "Importance to This Job":

Each of the items in the questionnaire which uses the "Importance to This Job (1)" scale is to be rated in terms of how important the activity described in the item is to the completion of the job. Consider such factors as amount of time spent, the possible influence on overall job performance if the worker does not properly perform this activity, etc.

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

21 | I | Far visual differentiation (seeing differences in the details of objects, events, or features *beyond arm's reach*, for example, operating a vehicle, landscaping, sports officiating, etc.)

22 | I | Depth perception (judging the distance from the observer to objects, or the distances between objects as they are positioned in space, as in operating a crane, operating a dentist's drill, handling and positioning objects, etc.)

23 | I | Color perception (differentiating or identifying objects, materials, or details thereof on the basis of color)

24 | I | Sound pattern recognition (recognizing different patterns, or sequences of sounds, for example, those involved in Morse code, heartbeats, engines not functioning correctly, etc.)

25 | I | Sound differentiation (recognizing differences or changes in sounds in terms of their loudness, pitch, and/or tone quality, for example, piano tuner, sound-system repairman, etc.)

26 | I | Body movement sensing (sensing or recognizing changes in the direction or speed at which the body is moving without being able to sense them by sight or hearing, for example, as in flying aircraft, working in a submarine, etc.)

27 | I | Body balance (sensing the position and balance of the body when body balance is *critical* to job performance, as when walking on I beams, climbing high poles, working on steep roofs, etc.)

1.3 Estimation Activities

In this section are various operations involving estimation or judging activities. In each case consider activities in which the worker may use any or all of the senses, for example, sight, hearing, touch, etc.

28 | I | Estimating speed of moving parts (estimating the speed of the moving *parts* associated with *stationary* objects, for example, the revolutions per minute of a motor, the speed at which a lathe turns, etc.)

29 | I | Estimating speed of moving objects (estimating the speed of moving *objects* or *materials* relative to a fixed point or to other moving objects, for example, the speed of vehicles, materials on a conveyor belt, flow of liquids in transparent pipes, etc.)

INFORMATION INPUT and MENTAL PROCESSES

1.3 Estimation Activities (con't.)

30 | I | Estimating speed of processes (estimating the speed of ongoing *processes* or a series of events while they are taking place, for example, chemical reactions, assembly operations, timing of food preparation in a cafeteria, etc.)

31 | I | Judging condition/quantity (estimating the condition, quality, and/or value of objects, for example, antique dealer, appraiser, jeweler, used-car dealer, coin dealer, etc.)

32 | I | Inspecting (inspecting products, objects, materials, etc., either one's own workmanship or that of others, in terms of established standards, for example, identifying defects, classifying by grade, etc.; do *not* include here activities described in item 31 above)

33 | I | Estimating quantity (estimating the *quantity* of objects *without direct measurement*, including weight, number, volume, etc., for example, estimating the board feet of lumber in a log, the weight of a beam, the number of bacteria in an area by looking through a microscope, etc.)

34 | I | Estimating size (estimating the *dimensions* of objects *without direct measurements*, including length, thickness, etc., for example, estimating the height of a tree, judging sizes of boxes or furniture in loading a truck, etc.)

35 | I | Estimating time (estimating the time required for past or future events or work activities, for example, judging the amount of time to make a delivery, estimating the time required to service a worn machine part or piece of equipment, judging the length of time required to change a production line procedure, etc.)

2 MENTAL PROCESSES

2.1 Decision Making, Reasoning, and Planning/Scheduling

36 | S | Decision making (indicate, using the code below, the level of decision making typically involved in the job, considering: the number and complexity of the factors that are taken into account; the variety of alternatives available; the consequences and importance of the decisions; the background experience, education, and training required; the precedents available for guidance; and other relevant considerations. The examples given for the following codes are *only* suggestive.)

Code *Level of Decision*

1 Very limited ("decisions" such as those in selecting parts in routine assembly, shelving items in a warehouse, pasting labels on cartons, tending automatic machines, etc.)

2 Limited ("decisions" such as those in operating a wood planer, dispatching a taxi, lubricating an automobile, etc.)

3 Intermediate ("decisions" such as those in setting up machine tools for operation, diagnosing mechanical disorders of aircraft, reporting news, supervising auto service workers, etc.)

4 Substantial ("decisions" such as those in determining production quotas, making personnel decisions such as promoting and hiring, etc.)

5. Very substantial ("decisions" such as those in approving corporation annual budget, recommending major surgery, selecting the location for a new plant, etc.)

MENTAL PROCESSES

37 | S | Reasoning in problem solving (indicate, using the code below, the level of reasoning that is required of the worker in applying knowledge, experience, and judgment to problems)

Code Level of Reasoning in Problem Solving

1 Very limited (use of common sense to carry out simple, or relatively uninvolved instructions, for example, hand assembler, mixing machine operator, etc.)

2 Limited (use of some training and/or experience to select from a limited number of solutions the most appropriate action or procedure in performing the job, for example, salesperson, electrician apprentice, library assistant, etc.)

3 Intermediate (use of relevant principles to solve practical problems and to deal with a variety of concrete variables in situations where only limited standardization exists, for example, many supervisors, technicians, etc.)

4 Substantial (use of logic or scientific thinking to define problems, collect information, establish facts, and draw valid conclusions, for example, petroleum engineer, personnel director, manager of a "chain" store, etc.)

5 Very substantial (use of *principles* of logical or scientific thinking to solve a wide range of intellectual and practical problems, for example, research chemist, nuclear physicist, corporate president, or manager of a large branch or plant, etc.)

38 | S | Amount of planning/scheduling (indicate, using the code below, the amount of planning/scheduling the worker is required to do which affects his/her own activities and/or the activities of others)

Code Amount of Planning

N Does not apply (has no opportunity even to plan own activities, the specific activities of the worker are virtually predetermined.)

1 Very limited (has limited opportunity to plan or schedule own activities, for example, punch press operator, inspector, etc.)

2 Limited (some planning is required but not a great deal, for example, the planning done by a lab technician, TV repairer, etc.)

3 Moderate (a moderate amount of planning of own or other activities is required, for example, a carpenter who must plan the best way to build a structure, an electrician, a police officer, a dietician, etc.)

4 Considerable (a fairly large amount of planning/scheduling is required, for example, a supervisor who must plan the activities of subordinates, a teacher who must prepare lectures or lesson plans, a material coordinator who must plan/schedule the arrival and distribution of materials, etc.)

5 Extensive (substantial amount of planning/scheduling is required, for example, a department store manager, an executive who must plan the activities of different work groups, an architect, a scientist who must make comprehensive and detailed plans to perform experiments, etc.)

2.2 Information Processing Activities

In this section are various human operations involving the "processing" of information or data. Rate each of the following items in terms of how *important* the activity is to the completion of the job.

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

39 | I | Combining information (*combining*, synthesizing, or integrating information or data from two or more sources to establish new facts, hypotheses, theories, or a more complete body of *related* information, for example, an economist using information from various sources to predict future economic conditions, a pilot flying aircraft, a judge trying a case, etc.)

40 | I | Analyzing information or data (for the purpose of identifying *underlying* principles or facts by *breaking down* information into component parts, for example, interpreting financial reports, diagnosing mechanical disorders or medical symptoms, etc.)

41 | I | Compiling (gathering, grouping, classifying, or in some other way arranging information or data in some meaningful order or form, for example, preparing reports of various kinds, filing correspondence on the basis of content, selecting particular data to be gathered, etc.)

42 | I | Coding/decoding (coding information or converting coded information back to its original form, for example, "reading" Morse code, translating foreign languages, or using other coding systems such as shorthand, mathematical symbols, computer languages, drafting symbols, replacement part numbers, etc.)

43 | I | Transcribing (copying or posting data or information for later use, for example, copying meter readings in a record book, entering transactions in a ledger, etc.)

44 | I | Other information processing activities (specify) _____

2.3 Use of Learned Information

45 | I | Short-term memory (learning and retaining job-related information and recalling that information after a brief period of time, for example, waitress, short-order cook, telephone operator, etc.)

46 | I | Education (indicate, using the code below, the level of knowledge typically acquired through formal education that is *required* to perform this job. Do *not* consider the type of knowledge typically acquired in technical or vocational schools — see item 48)

Code Education (level of knowledge acquired through formal education or equivalent)

- N Does not apply (little or no formal education required)
- 1 Less than that required for completion of high school curriculum
- 2 Level obtained by completion of high school curriculum
- 3 Level obtained by some college work
- 4 Level obtained by completion of usual college curriculum
- 5 Level obtained by completion of advanced curriculum (such as graduate school, medical school, law school, etc.)

MENTAL PROCESSES

2.3 Use of Learned Information (con't.)

47 S Job-related experience (indicate, using the code below, the amount of *all-previous* job-related experience in other *related* or *lower-level* jobs generally *needed* as background to learn this job; do *not* include formal education as described in item 46)

Code Job-related Experience

- N Does not apply (no experience required)
- 1 Less than 1 month
- 2 Over 1 month up to and including 12 months
- 3 Over 1 year up to and including 3 years
- 4 Over 3 years up to and including 5 years
- 5 over 5 years

48 S Training (indicate, using the code below, the total amount of training generally *needed* for persons who have had no prior job training to learn to perform adequately on this job; consider all types of required *job-related* training except for education described in item 48; include training at barber schools, technical and vocational schools, business schools, etc., as well as apprentice, on-the-job, off-the-job and orientation training, etc.)

Code Training

- N Does not apply or very limited (no more than one day's training required)
- 1 Over 1 day up to and including 30 days
- 2 Over 30 days up to and including 6 months
- 3 Over 6 months up to and including 1 year
- 4 Over 1 year up to and including 3 years
- 5 Over 3 years

49 S Using mathematics (indicate, using the code below, the highest level of mathematics that the individual must understand as required by the job)

Code Level of Mathematics

- N Does not apply
- 1 Simple basic (counting, addition and subtraction of 2-digit numbers or less)
- 2 Basic (addition and subtraction of numbers of 3 digits or more, multiplication, division, etc.)
- 3 Intermediate (calculations and concepts involving fractions, decimals, percentages, etc.)
- 4 Advanced (algebraic, geometric, trigonometric, and statistical concepts, techniques, and procedures usually applied in standard practical situations)
- 5 Very advanced (advanced mathematical and statistical theory, concepts, and techniques, for example, calculus, topology, vector analysis, factor analysis, probability theory, etc.)

3 WORK OUTPUT

3.1 Use of Devices and Equipment

3.1.1 Hand-held Tools or Instruments

Consider in this category those devices which are used to move or modify workpieces, materials, products, or objects. Do *not* consider measuring devices here.

Code	*Important to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

Manually powered

50 | I | Precision tools/ instruments (that is, tools or instruments powered by the *user* to perform *very accurate* or *precise* operations, for example, the use of engraver's tools, watchmaker's tool's, surgical instruments, etc.)

51 | I | Nonprecision tools/instruments (tools or instruments powered by the *user* to perform operations *not* requiring *great* accuracy or precision, for example, hammers, wrenches, trowels, knives, scissors, chisels, putty knives, strainers, hand grease guns, etc.; do *not* include long-handled tools here)

52 | I | Long-handle tools (hoes, rakes, shovels, picks, axes, brooms, mops, etc.)

53 | I | Handling devices/tools (tongs, ladles, dippers, forceps, etc., used for moving or handling objects and materials; do *not* include here protective gear such as asbestos gloves, etc.)

Powered (manually controlled or directed devices using an energy source such as electricity, compressed air, fuel, hydraulic fluid, etc., in which the component part which accomplishes the modification is hand-held, such as dentist drills, welding equipment, etc., as well as devices small enough to be entirely hand-held)

54 | I | Precision tools/instruments (hand-held powered tools or instruments used to perform operations requiring *great* accuracy or precision, such as small dentist drills, or laboratory equipment used for *especially accurate* or *fine* work)

55 | I | Nonprecision tools/instruments (hand-held, energy-powered tools or instruments used to perform operations *not* requiring *great* accuracy or precision, for example, ordinary power saws, large sanders, clippers, hedge trimmers, etc., and related devices such as electric soldering irons, spray guns or nozzles, welding equipment, etc.)

3.1.2 Other Hand-held Devices

56 | I | Drawing and related devices (instruments or devices used in lettering, sketching, illustrating, drafting, etc., for example, pens, pencils, drawing instruments, artist's brushes, drafting equipment, etc.; do not include measuring instruments here; see item 58)

57 | I | Applicators (brushes, rags, paint rollers, etc., which are hand-held and used in applying solutions, materials, etc.; do *not* consider devices covered by items 50-55 above)

58 | I | Measuring devices (rules, measuring tapes, micrometers, calipers, protractors, squares, thickness gauges, levels, volume measuring devices, tire gauges, etc.)

59 | I | Technical and related devices (cameras, stopwatches, hand-held calculators, etc.)

60 | I | Other hand-held tools and devices (specify) _____

3.1.3 Stationary Devices

61 | I | Machines/equipment (operating, controlling, adjusting or monitoring machines/equipment used to process, calculate, fabricate, or otherwise modify parts, objects, materials, etc.; use this category in addition to indicating the controls used in the subsection which follows, e.g., items 62 through 69)

3.1.4 Control Devices (on any equipment operated or used)

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

62 | I | Activation controls (hand- or foot-operated devices used to start, stop, or otherwise activate energy-using systems or mechanisms, for example, light switches, electric motor switches, ignition switches, etc.)

63 | I | Fixed setting controls (hand- or foot-operated devices with distinct positions, detents, or definite settings, for example, TV selector switch, gearshift, etc.)

64 | I | Variable setting controls (hand- or foot-operated devices that can be set at the beginning of operation, or infrequently, at any position along a scale, for example, TV volume control, room thermostat, rheostat, etc.)

65 | I | Keyboard devices (typewriters, adding machines, calculators, pianos, keypunch machines, computer terminals, etc.)

Frequent-adjustment controls (used in making *frequent* adjustments of mechanisms operated as required by the job)

66 | I | Hand-operated controls (controls operated by hand or arm for making *frequent*, but *not continuous*, adjustments, for example, hand controls on a crane or bulldozer, helm of ship, etc.)

67 | I | Foot-operated controls (controls operated by foot or leg for making *frequent*, but *not continuous*, adjustments, for example, automobile brakes, etc.)

Continuous controls (used *continuously* in operation or use with any mechanisms operated as required by the job.)

68 | I | Hand-operated controls (controls operated by hand and used *continuously* for adjusting to changing, or possible changing, situations, for example, use of steering wheel, controls on a "tracking" device, etc.)

69 | I | Foot-operated controls (controls operated by foot and used *continuously* for adjusting to changing, or possibly changing, situations, for example, accelerator, etc.)

3.1.5 Transportation and Mobile Equipment

70 | Man-powered vehicles (bicycles, rowboats, canoes, etc.)

71 | Powered highway/rail vehicles (vehicles intended primarily for highway or railroad transportation, for example, automobiles, trucks, buses, trains, etc.)

72 | Powered mobile equipment (movable vehicles *not* primarily intended for highway use, for example, warehouse trucks, fork lifts, self-propelled lawn mowers, road graders, tractors, combines, etc.)

73 | Powered water vehicles (ships, submarines, motorboats, etc.)

74 | Air/space vehicles (planes, helicopters, balloons, gliders, rocket ships, etc.)

75 | Man-moved mobile equipment (hand-pushed lawn mowers with or without powered blades, hand trucks, wheelbarrows, floor polishers and buffers, etc.)

76 | Operating equipment (cranes, hoists, elevators, etc.)

77 | Remote-controlled equipment (conveyor systems, etc.)

3.2 Manual Activities

This section describes manual activities in which tools may or may not be used.

78 | Setting up/adjusting (adjusting, calibrating, aligning and/or setting up of machines or equipment, for example, setting up a lathe or drill press, adjusting an engine carburetor, adjusting, calibrating, and aligning electric circuitry, etc.)

79 | Manually modifying (using hands *directly* to form or otherwise modify materials or products, for example, kneading dough by hand, folding letters, massaging, etc.)

80 | Material controlling (manually controlling or guiding materials being processed, for example, in operating sewing machine, jig saws, etc.)

81 | Assembling/disassembling (either manually or with the use of hand tools putting parts or components together to form more complete items, or taking apart or disassembling items into their component parts)

82 | Arranging/positioning (manually placing objects, materials, persons, animals, etc., in a specific position or arrangement, for example, arranging library books, window displays, stocking shelves, positioning patients for certain medical and dental procedures, etc.; do *not* include here arranging/positioning which is a part of the operations listed in items 78-81)

83 | Feeding/off-bearing (manually inserting throwing, dumping, or placing materials into or removing them from *machines* or *processing equipment;* this category is *not* to be used in describing operations in which the worker manually *guides* or *controls* the materials or parts during processing, as in item 80)

WORK OUTPUT

84 I Physical handling (physically handling objects, materials, animals, human beings, etc., either manually or with nominal use of aiding devices, for example, in certain warehousing activities, loading/unloading conveyor belts or trucks, packaging, farming activities, hospital procedures, etc.; typically there is little requirement for carefully positioning or arrangement of objects; include here relatively uninvolved handling operations *not* provided for in items 78-83)

3.3 Activities of the Entire Body

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

85 I Highly skilled body coordination (activities involving extensive, and often highly learned coordination activities of the whole body, for example, athletics, dancing, etc.)

86 I Balancing (maintaining body balance or equilibrium to prevent falling when standing, walking, running, crouching, etc., on narrow, slippery, steeply inclined, or erratically moving surfaces, for example, walking on narrow elevated beam, working on steep roof, etc.)

3.4 Level of Physical Exertion

87 S Level of physical exertion (indicate, using the code below, the general level of body activity, considering the *frequency* and *effort* required to perform job tasks involving pushing, pulling, carrying, lifting, etc., during an average work day)

Code Level of Physical Exertion

1 Very light (occasionally walking or standing and/or occasionally moving light objects, materials, etc., such as secretary, drafter, watchmaker, telephone operator, etc.)

2 Light (frequently walking or standing and/or frequently exerting force equivalent to lifting up to approximately 10 pounds and/or occasionally exerting force equivalent to lifting about 20 pounds, for example, sales clerk, bank teller, etc.)

3 Moderate (frequently exerting forces equivalent to lifting up to approximately 25 pounds and/or occasionally exerting forces equivalent to lifting up to approximately 50 pounds, for example, auto mechanic, coin vending machine serviceman, porter, parts salvager, etc.)

4 Heavy (frequently exerting forces equivalent to lifting up to approximately 50 pounds and/or occassionally exerting forces equivalent to lifting up to approximately 100 pounds, for example, general laborer, millwright, bulldozer operator, etc.)

5 Very heavy (frequently exerting forces equivalent to lifting *over* 50 pounds and/or occasionally exerting forces *over* that required to lift 100 pounds, for example, hod carrier, quarry miner, etc.)

Code	Amount of Time (T)
N	Does not apply (or is very incidental)
1	Under 1/10 of the time
2	Between 1/10 and 1/3 of the time
3	Between 1/3 and 2/3 of the time
4	Over 2/3 of the time
5	Almost continually

3.5 Body Positions/Postures

Indicate by code the approximate *proportion of working time* the worker is engaged in the following activities (88-92)

88 | T | Sitting

89 | T | Standing (do *not* include walking)

90 | T | Walking/running

91 | T | Climbing (for example, house painter, telephone lineman, etc.)

92 | T | Kneeling/stooping (kneeling, stooping, crawling, crouching, and other related body positions which may be uncomfortable or awkward)

Code	Importance to This Job (I)
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

3.6 Manipulation/Coordination Activities

Rate the following items in terms of how *important* the activity is to completion of the job.

93 | I | Finger manipulation (making careful finger movements in various types of activities, for example, fine assembly, use of precision tools, repairing watches, use of writing and drawing instruments, hand painting of china, etc.; usually the hand and arm are *not* involved to any great extent)

94 | I | Hand-arm manipulation (the manual control or manipulation of objects through hand and/or arm movements, which may or may not require continuous visual control, for example, repairing automobiles, packaging products, etc.)

95 | I | Hand-arm steadiness (maintaining a uniform, controlled hand-arm posture or movement, for example, using a welding torch, performing surgery, etc.)

96 | I | Eye-hand/foot coordination (the *coordination* of hand and/or foot movements where the movement *must* be coordinated with what is seen, for example, driving a vehicle, operating a sewing machine, etc.)

97 | I | Limb movement without visual control (movement of body limbs from one position to another without the use of vision, for example, reaching for controls without looking, playing a musical instrument, touch typing, etc.)

98 | I | Hand-ear coordination (the coordination of hand movements with sounds or instructions that are heard, for example, tuning radio receivers, tuning musical instruments by ear, piloting aircraft by control tower instructions, etc.)

4 RELATIONSHIPS WITH OTHER PERSONS

This section deals with different aspects of interaction between people involved in various kinds of work.

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

4.1 Communications

Rate the following in terms of how *important* the activity is to the completion of the job. Some jobs may involve several or all of the items in this section.

4.1.1 Oral (communicating by speaking)

99 | I | Advising (dealing with individuals in order to counsel and/or guide them with regard to problems that may be resolved by legal, financial, scientific, technical, clinical, spiritual, and/or other professional principles)

100 | I | Negotiating (dealing with others in order to reach an agreement or solution, for example, labor bargaining, diplomatic relations, etc.)

101 | I | Persuading (dealing with others in order to influence them toward some action or point of view, for example, selling, political campaigning, etc.)

102 | I | Instructing (the teaching of knowledge or skills, in either an informal or a formal manner, to others, for example a public school teacher, a machinist teaching an apprentice, etc.)

103 | I | Interviewing (conducting interviews directed toward some specific objective, for example, interviewing job applicants, census taking, etc.)

104 | I | Routine information exchange: job related (the giving and/or receiving of *job-related* information of a routine nature, for example, ticket agent, taxicab dispatcher, receptionist, etc.)

105 | I | Nonroutine information exchange (the giving and/or receiving of *job-related* information of a nonroutine or unusual nature, for example, professional committee meetings, engineers discussing new product design, etc.)

106 | I | Public speaking (making speeches or formal presentations before relatively large audiences, for example, political addresses, radio/TV broadcasting, delivering a sermon, etc.)

4.1.2 Written (communicating by written/printed material)

107 | I | Writing (for example, writing or dictating letters, reports, etc., writing copy for ads, writing newspaper articles, etc.; do *not* include transcribing activities described in item 43, but only activities in which the incumbent creates the written material)

4.1.3 Other Comunications

108 | I | Signaling (communicating by some type of signal, for example, hand signals, semaphore, whistles, horns, bells, lights, etc.)

109 | I | Code communications (telegraph, cryptography, etc.)

4.2 Miscellaneous Interpersonal Relationships

110 | I | Entertaining (performing to amuse or entertain others, for example, on stage, TV, nightclubs, etc.)

111 | I | Serving/catering (attending to the needs of, or performing personal services for, others, for example, waiting on tables, hairdressing, attending hospital patients, etc.)

4.3 Amount of Job-required Personal Contact

112 | S | Job-required personal contact (indicate, using the code below, the extent of job-required contact with others, individually or in groups, for example, contact with customers, patients, students, the public, superiors, subordinates, fellow employees, prospective employees, official visitors, etc.; consider *only* personal contact which is definitely *part* of the job)

Code Extent of Required Personal Contact

1 Very infrequent (almost no contact with others is required)
2 Infrequent (limited contact with others is required)
3 Occasional (moderate contact with others is required)
4 Frequent (considerable contact with others is required)
5 Very frequent (almost continual contact with others is required)

4.4 Types of Job-required Personal Contact

This section lists types of individuals with whom the worker must have personal contact in order to perform the job. Indicate by code the *importance* of contact with each of the types of individuals listed below. Consider personal contact not only with personnel within the organization or company, but also with personnel from other organizations, if contact with them is *part* of the job.

113 | I | Executives/officials (corporation vice-presidents, government administrators, plant superintendents, etc.)

114 | I | Middle management/staff personnel

115 | I | Supervisors (those personnel who have *immediate* responsibility for a work group, for example, foremen, some office managers, other first level supervisors, etc.)

116 | I | Professional personnel (doctors, lawyers, scientists, engineers, professors, teachers, consultants, etc.)

117 | I | Semiprofessional personnel (technicians, drafters, designers, photographers, surveyors, and other personnel who are engaged in activities requiring fairly extensive education or practical experience but which typically involve a more restricted area of operation than that of professional personnel)

118 | I | Clerical personnel (personnel engaged in office work and word processing, such as clerks, bookkeepers, receptionists, secretaries, etc.)

RELATIONSHIPS WITH OTHER PERSONS

4.4 Types of Job-required Personal Contact (con't.)

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

119 | I | Manual and service workers (personnel in skilled, semiskilled, unskilled, agricultural, fishing, forestry, service, and related types of occupations, etc.)

120 | I | Sales personnel

121 | I | Buyers (purchasing agents, not public customers)

122 | I | Public customers (as in stores, restaurants, etc.)

123 | I | The public (*not* including customers or persons in other specified categories; include the "public" as contacted by, for example, park attendants, police officers, etc.)

124 | I | Students/trainees/apprentices

125 | I | Clients/patients/counselees

126 | I | Special interest groups (stockholders, lobbyists, fraternal organizations, property owners, government and regulatory inspectors and officials, charities, etc.)

127 | I | Other individuals (include here types of persons *not* described in items 113-126, above, but, whenever possible, use one of the above categories)
(Specify) _____

4.5 Supervision and Coordination

4.5.1 Supervision/Direction Given

128 | S | Supervision of nonsupervisory personnel (indicate, using the code below, the number of persons *directly* supervised who are *actually* involved in the production of goods and services and *do not* supervise others; this item would apply, for example, to most "first line" supervisors, most managers and section heads, service managers in garages, head butchers in meat departments of grocery stores, head pharmacists, laboratory technicians with direct supervision over assistants, etc.)

Code	*Number of Nonsupervisory Personnel Supervised*
N	Does not apply
1	1 or 2 workers
2	3 to 5 workers
3	6 to 8 workers
4	9 t0 12 workers
5	13 or more workers

RELATIONSHIPS WITH OTHER PERSONS

129 | S | Direction of supervisory personnel (indicate, using the code below, the number of supervisory personnel — those who have responsibility for the supervision or direction of others — who report *directly* to the person holding *this* position; this item would apply to many middle and upper managers, but would also apply to mangers of many small businesses or other activities who delegate supervisory authority to others, etc.)

Code	*Number of Supervisory Personnel Directed*
N	Does not apply (does not direct supervisors)
1	1 or 2 supervisory personnel
2	3 to 5 supervisory personnel
3	6 to 8 supervisory personnel
4	9 to 12 supervisory personnel
5	13 or more supervisory personnel

130 | S | Total number of personnel for whom responsible (indicate, using the code below, the total number of personnel for whom the person holding this job is either *directly* or *indirectly* responsible, for example, the president of a corporation would be responsible for all corporation employees, the branch manager would be responsible for personnel in the branch, an office manager for personnel supervised, etc.; use this item *in addition* to 128 and/or 129)

Code	*Total Number of Personnel for Whom Responsible*
N	Does not apply (not responsible for other personnel)
1	10 or fewer workers
2	11 to 50 workers
3	51 to 250 workers
4	251 to 750 workers
5	751 or more workers

4.5.2 Other Organizational Activities

This subsection includes activities of a coordinating, staff, or supervisory nature.

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

131 | I | Supervises nonemployees (students, patients, campers, etc.)

132 | I | Coordinates activities (coordinates, monitors, or organizes the activities of others to achieve certain objectives, but *does not* have line management authority, for example, social director, committee chairperson, etc.)

133 | I | Staff functions (advises, consults, or gives other types of assistance to line management personnel, for example, legal adviser, administrative assistant, etc.)

RELATIONSHIPS WITH OTHER PERSONS and JOB CONTEXT

4.5.3 Supervision Received

134 | S | Supervision received (indicate, using the code below, the level of supervision the worker typically receives)

Code Level of Supervision Received

1 Immediate supervision (receives close supervision relating to specific work activities, including assignments, methods, etc.; usually receives frequent surveillance over job activities)

2 General supervision (receives general supervision relating to work activities)

3 General direction (receives only very general guidance relating to job activities, primarily guidance with respect to general objectives; has rather broad latitude for deterimining methods, work scheduling, how to achieve objectives, etc., for example, first-line supervisors, lower-management individuals, most staff personnel, people whose work is quite independent of others, etc.)

4 Nominal direction (receives only nominal direction or guidance in job, as in the case of a manager of an organization or a major subdivision thereof, and is therefore subject only to very broad policy guidelines, for example, some research scientists who are given viratually free rein, many plant superintendents, etc.)

5 No supervision (this category is applicable to those personnel who function independently, for example, owner-managers of stores, independent physicians, independent consultants, etc.)

5 JOB CONTEXT

5.1 Physical Working Conditions

This section lists various working conditions. Rate the *average* amount of time the worker is exposed to each condition during a *typical* work period.

Code	*Amount of Time (T)*
N	Does not apply (or is very incidental)
1	Under 1/10 of the time
2	Between 1/10 and 1/3 of the time
3	Between 1/3 and 2/3 of the time
4	Over 2/3 of the time
5	Almost continually

5.1.1 Outdoor environment

135 | T | Out-of-door environment (subject to changing weather conditions)

5.1.2 Indoor temperatures (do not consider indoor temperature conditions that are simply a function of the weather, for example, heat in summer; consider only those conditions which are associated with this job regardless of the natural climate in which it might be performed)

136 | T | High temperature (conditions in which the worker might experience severe discomfort or heat stress, such as in boiler rooms, around furnaces, etc.; typically this would occur in a dry atmosphere at about 90° F, and in a humid atmosphere at about 80° F, or 85° F.)

137 | T | Low temperature (conditions in which the worker is exposed to low temperatures which are definitely uncomfortable even though clothing appropriate for the conditions may be worn, such as in refrigerated rooms, etc.)

5.1.3 Other Physical Working Conditions

138 T Air contamination (dust, fumes, smoke, toxic conditions, disagreeable odors, etc.; consider here air contamination or pollution which is an irritating or undesirable aspect of the job)

139 T Vibration (vibration of whole body or body limbs, for example, driving a tractor or truck, operating an air hammer, etc.)

140 T Improper illumination (inadequate lighting, excessive glare, etc.)

141 T Dirty environment (situations in which workers and/or their clothing easily become dirty, greasy, etc., for example, environments often associated with garages, foundries, coal mines, highway construction, furnace cleaning, etc.)

142 T Awkward or confining work space (conditions in which the body is cramped or uncomfortable)

143 S Noise intensity (indicate, using the code below, the typical noise level to which the worker is exposed)

Code	*Noise Intensity*
1	Very quiet (intensive care ward in hospital, greenhouse, photo lab, etc.)
2	Quiet (many private offices, libraries, etc.)
3	Moderate (business office where typewriters are used, light automobile traffic, department store, etc.)
4	Loud (many factories, heavy traffic, machine shops, carpenter shops, etc.
5	Very loud (close to jet engines, large earth-moving equipment, riveting, etc.)

5.2 Physical Hazards

The four items which follow on the next page describe accidents or illnesses which may result from exposure to hazards. Rate the *possibility* of the occurrence of each of the types of accidents/illnesses to the *typical* worker on this job. In making the ratings consider the safety/accident record of employees on this job, and/or the possiblity of accidents due to such factors as: traveling at high speeds, being in high places, working with machinery, sharp tools, hot or very cold materials, exposure to falling objects, dangerous chemicals, explosives, toxic fumes, radiation, etc.

JOB CONTEXT

5.2 Physical Hazards (Con't.)

Code	Possibility of Occurrence (P)
N	Almost no possibility
1	Very limited
2	Limited
3	Moderate
4	Fairly high
5	High

144 P First-aid cases (minor injuries or illnesses which typically result in a day or less of "lost" time and are usually remedied with first-aid procedures)

145 P Temporary disability (temporary injuries or illnesses which prevent the worker from performing the job from one full day up to extended periods of time but which do not result in permanent disability or impairment)

146 P Permanent partial impairment (injuries or illnesses resulting in the amputation or permanent loss of use of any body member or part thereof, or permanent impairment of certain body functions)

147 P Permanent total disability/death (injuries or illnesses which totally disable the worker and permanently prevent further gainful employment, for example, loss of life, sight, limbs, hands, or radiation sickness, etc.)

5.3 Personal and Social Aspects

This section includes various personal and social aspects of jobs. Indicate by code the *importance* of these aspects as part of the job.

Code	Importance to This Job (I)
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

148 I Civic obligations (because of the job the worker assumes, or is expected to assume, certain civic obligations or responsibilities)

149 I Frustrating situations (job situations in which attempts to deal with problems or to achieve job objectives are obstructed or hindered, and may thus contribute to frustration on the part of the worker)

150 I Strained personal contacts (dealing with individuals or groups in "unpleasant" or "strained" situations, for example, certain aspects of police work, certain types of negotiations, handling certain mental patients, collecting past due bills, etc.)

151 I Personal sacrifice (being willing to make certain personal sacrifices while being of service to other people or the objectives of an organization, for example, in law enforcement, in the ministry, in social work, etc.; do not consider physical hazards here)

152 I Interpersonal conflict situations (job situations in which there are virtually inevitable differences in ojectives, opinions, or viewpoints between the worker and other persons or groups of persons, and which may "set the stage" for conflict, for example, persons involved in labor negotiations, supervisors who must enforce an unpopular policy, etc.)

JOB CONTEXT and OTHER JOB CHARACTERISTICS

5.3 Personal and Social Aspects (con't.)

153 | S | Non-job-required social contact (indicate, using the code below, the *opportunity* to engage in *informal, non-job-required* conversation, social interaction, etc., with others while on the job, for example, barber, taxi driver, receptionist, journeyman and apprentice, etc.; do *not* include here the personal contacts *required* by the job as described in item 112)

Code Opportunity for Non-job-required Social Contact

1 Very infrequent (almost no opportunity)
2 Infrequent (limited opportunity)
3 Occasional (moderate opportunity)
4 Frequent (considerable opportunity)
5 Very frequent (almost continual opportunity)

6 OTHER JOB CHARACTERISTICS

6.1 Apparel Worn

Code Applicability (A)
N Does not apply
1 Does apply

For each item mark N (Does not apply) if the item does *not* apply, a one (1) if the item applies. Note: one or more items in this section may be applicable.

154 | A | Business suit or dress (expected to wear presentable clothing such as tie and jacket, street dress, etc., as customary in offices, stores, etc.)

155 | A | Special uniform/apparel (nurse, police officer, bus driver, etc.)

156 | A | Work clothing ("blue collar" apparel worn in factories, construction work, etc.)

157 | A | Protective clothing or gear (clothing or equipment worn as a regular part of the job to protect the worker, for example, safety helmets, goggles, noise suppressors, safety shoes, insulated gloves or clothing, protective masks, etc.; this item does *not* apply if worn only occasionally or rarely)

158 | A | Informal attire (sportswear, etc.)

159 | A | Apparel style optional

6.2 Licensing

160 | A | Licensing/certification required (such as a lawyer being certified by the Bar, etc.)

OTHER JOB CHARACTERISTICS

6.3 Work Schedule

Code	*Applicability (A)*
N	Does not apply
1	Does apply

In *each* of the three groups of items (in boxes) below: mark a one (1) for the item in each boxed group that most nearly applies; mark N for *all other* items in the same boxed group.

6.3.1 Continuity of Work (as relevant to total year)

161 [A] Regular work

162 [A] Irregular work (depending on weather, season, production changes, etc.)

6.3.2 Regularity of Working Hours

163 [A] Regular hours (same basic work schedule every week)

164 [A] Variable shift work (work shift varies from time to time)

165 [A] Irregular hours (works variable or irregular hours, depending on requirements of employer, convenience of customers, etc., for example, insurance agents, etc.)

6.3.3 Day-night Schedule

166 [A] Typical day hours (typical from morning through late afternoon)

167 [A] Typical night hours (including work during the evening hours or at night)

168 [A] Typical day and night hours (works some days and some nights, depending on work shifts, job demands, schedules, or other job factors, for example, some policemen, some truck drivers, some steelworkers, etc.)

6.4 Job Demands

This section lists various types of demands that the job situation may impose upon workers, usually requiring that they adapt to these in order to perform their work satisfactorily. Rate the following items in terms of how *important* they are on the job.

Code	*Importance to This Job (I)*
N	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

169 [I] Specified work pace (on continuous assembly line, etc.)

170 [I] Repetitive activities (performance of the same physical or mental activities repeatedly, without interruption, for periods of time)

171 [I] Cycled work activities (performance of a sequence or schedule of work activities which typically occurs on a weekly, daily, or hourly basis and which typically allows the workers some freedom of action so long as they meet a schedule, for example, mail carriers making rounds on their routes, security guards patrolling their beat, etc.; do *not* include here activities more nearly described as repetitive ativities in item 170 above)

6.4 Job Demands (con't.)

172 | I | Following set procedures (need to follow specific set procedures or routines in order to obtain satisfactory outcomes, for example, following check-out lists to inspect equipment or vehicles, following procedures for changing a tire, performing specified laboratory tests, etc.)

173 | I | Time pressure of situation (rush hours in a restaurant, urgent time deadlines, rush jobs, etc.)

174 | I | Precision (need to be more than normally precise and accurate)

175 | I | Attention to detail (need to give careful attention to various details of one's work, being sure that nothing is left undone)

176 | I | Recognition (need to identify, recognize, or "perceive" certain objects, events, processes, behavior, etc., or aspects, features, or properties thereof; this item is primarily concerned with "recognition" of that which is "sensed" by vision, hearing touch, etc.)

177 | I | Vigilance: infrequent events (need to continually search for *very infrequently* occurring but relevant events in the job situation, for example, forest lookout watching for forest fires, worker observing instrument panel to identify infrequent change from "normal," etc.)

178 | I | Vigilance: continually changing events (need to be continually aware of variations in a continually or frequently changing situation, for example, driving in traffic, controlling aircraft traffic, continually watching frequently changing dials and gauges, etc.)

179 | I | Working under distractions (telephone calls, interruptions, disturbances from others, etc.)

180 | I | Updating job knowledge (need to keep job knowledge current, being informed of new developments related to the job)

181 | A | Special talent (use this item only if a job requires some *particularly* creative or unique talent or skill that is not covered by other items; typically this item would apply to jobs in which the very unique skill or characteristic of the worker is clearly dominant, as in certain artistic activities; the item may be used, however, in certain other kinds of situations, but *only* where there is some distinctly unique or special skill or talent involved)

Special talent: _____

Code	*Applicability (A)*
N	Does not apply
1	Does apply

Code	*Amount of Time (T)*
N	Does not apply (or is very incidental)
1	Under 1/10 of the time
2	Between 1/10 and 1/3 of the time
3	Between 1/3 and 2/3 of the time
4	Over 2/3 of the time
5	Almost continually

182 | T | Travel (indicate by code the proportion of *time* the worker is required to travel, usually overnight and away from the area of residence)

OTHER JOB CHARACTERISTICS

6.5 Responsibility

This section includes types of responsibility which may be associated with the decisions and actions of the worker. Indicate by code the degree of each type of responsibility involved in the job.

183 S Responsibility for the safety of others (indicate, using the code below, the degree to which the work requires diligence and effort to prevent injury to others; do *not* include hazards beyond the control of the individual concerned with the job)

Code Degree of Responsibility for the Safety of Others

- N Does not apply
- 1 Very limited (worker has minimum responsibility for the safety of others, for example, use of small hand tools, nonhazardous machines, etc.)
- 2 Limited (worker must exercise *reasonable* care in order to avoid injury to others, for example, operating lathes, punch presses, and other industrial machines, etc.)
- 3 Intermediate (worker must be *especially* careful in order to avoid injury to others, for example, operating overhead cranes, driving vehicles, etc.)
- 4 Substantial (worker must exercise *constant* and *substantial care in order to prevent serious injury to others, for example, handling dangerous chemicals, using explosives, etc.)*
- 5 *Very substantial (the safety of others depends almost entirely* on the correct action of the employee, for example, piloting an aircraft, performing major surgery, etc.)

184 S Responsibility for material assets (indicate, using the code below, the degree to which the worker is *directly* responsible for waste, damage, defects, or other loss of value to material assets or property, such as materials, products, parts, equipment, cash, livestock, etc., that might be caused by inattention or inadequate job performance)

Code Degree of Responsibility for Material Assets

- 1 Very limited
- 2 Limited
- 3 Intermediate
- 4 Substantial
- 5 Very substantial

185 S General responsibility (indicate, using the code below, the degree of "general" or overall responsibility associated with whatever activities are involved in the job, including consideration of the possible effects of the person's work activities on the organization, on other people, on the work output, etc., excluding consideration of responsibility for the safety of others or for material assets as described in item 183 and 184.)

Code Degree of General Responsibility

- 1 Very limited
- 2 Limited
- 3 Intermediate
- 4 Substantial
- 5 Very substantial

6.6 Job Structure

186 | S | Job structure (indicate, using the code below, the amount of "structure" of the job, that is, the degree to which the job activities are "predetermined" for the worker by the nature of the work, the procedures, or other job characteristics; the more highly structured jobs permit less deviation from predetermined patterns, and little if any need for innovation, decision making, or adaptation to changing situations)

Code Amount of Job Structure

1 Very high structure (virtually no deviation from a predetermined job "routine," for example, routine assembly work, etc.)
2 Considerable structure (only moderate deviation from predetermined work "routine" is possible, for example, stock handler, machine operator, etc.)
3 Intermediate structure (considerable change from a "routine" is possible; work activities change considerable from day to day or even from hour to hour, but usually within some reasonable and expected bounds, for example, cafeteria manager, etc.)
4 Limited structure (relatively little routine work; the job is characterized by considerable opportunity for improving methods, devices, etc., and the necessity of making decisions, for example, architect, industrial engineer, etc.)
5 Very low structure (virtually no established "routine" of activities; the position involves a wide variety of problems which must be dealt with; the solutions to these problems allow for unlimited resourcefulness and initiative, for example, research chemist, corporation vice-president, college professors, etc.)

6.7 Criticality of Position

187 | S | Criticality of position (indicate, using the code below, the degree to which the performance of activities associated with this job are critical in terms of their possible effects on the organizational operations, assets, reputation, etc., or on the public or other people. In rating a job, consider particularly the possible detrimental effect of inadequate job performance; consider the duration of such consequences, whether immediate or long-term, their seriousness, and the extent to which they have restricted or wide-spread effects)

Code Degree of Criticality of Position

1 Very low
2 Low
3 Moderate
4 High
5 Very high

OTHER JOB CHARACTERISTICS

6.8 Pay/Income

The following items are used to describe the typical method or way in which the worker receives pay/income and the amount received.

Method of Receiving Pay/Income

For each item on this side, mark N if the item does *not* apply, and a one (1) if it *does* apply.

Code	*Applicability (A)*
N	Does not apply
1	Does apply

Amount of Pay/Income (optional)

For each method of receiving pay/income listed at the left, that applies, write in the approximate amount of pay/income. This need only be reported for *one* time period in each case. (If this information is reported, it will be used *only* for research purposes, and will be held in *strictest confidence.*)

188	A	Salary	188 a. Weekly salary, or	$ ___
			b. Salary every 2 weeks, or	$ ___
			c. Monthly salary, or	$ ___
			d. Yearly salary	$ ___
189	A	Hourly wage	189 a. Wage per hour	$ ___
190	A	Incentive pay (individual or group)	190 a. Weekly average, or	$ ___
			b. Monthly average	$ ___
191	A	Commission	191 a. Weekly average, or	$ ___
			b. Monthly average, or	$ ___
			c. Yearly average	$ ___
192	A	Tips	192 a. Weekly average, or	$ ___
			b. Monthly average, or	$ ___
			c. Yearly average	$ ___
193	A	Supplementary compensation (for example, stocks, profit sharing, dividends, bonuses, donations, gifts, etc.)	193 a. yearly average	$ ___
194	A	Self-employed	194 a. Yearly average	$ ___

Appendix B

JAPQ Dimensions

DEFINITIONS OF DIMENSIONS OF WORK

The "Dimensions of Work: found in the JAPQ are weighted combinations of individual items. The weights assigned were found by factor analyzing those items as they were rated on a sample of jobs proportionately drawn to approximate the number of positions found in the U.S. economy (according to the 1970 U.S. Census). The sample consisted of 2200 positions selected from the PAQ data bank which are believed to represent on the basis of job content approximately 90% of the positions found in the United States. The sampling plan is indicated in Figure 1.

Figure 1

Basic Sampling Plan for Positions Included in the "World of Work" Sample

Occupational Categories (classified by DOT Codes which Correspond to Census Data		Percentage in Labor Force and Percentage of Positions Sampled
0, 1	Professional, Technical, and Managerial Occupations	24.5
2	Clerical and Sales Occupations	
	20-24 Clerical Occupations	16.9
	25-29 Sales Occupations	8.3
3	Service Occupations	13.1
4	Farming, Fishery, Forestry, and Related Occupations	3.6
5	Processing Occupations	2.4
6	Machine Trades Occupations	7.2
7	Bench Work Occupations	5.3
8	Structural Work Occupations	8.2
9	Miscellaneous Occupations	10.2

The separate factor analysis process used (Principal Components Analysis with Varimax Rotation) statistically determines which groups of job elements tend to be found together on jobs. Such groups of items contribute to a score which in this context is called a "dimension of work" score. By examining the degree to which item ratings are correlated with the dimension of work scores one can get an idea about the underlying nature of the dimension. Such information may be used to interpret and name the dimensions.

On the pages which follow, the names and definitions assigned to each dimension along with items which correlate substantially (greater than .30 or less than -.30) with the dimension scores are presented. Some

dimensions have many items which contribute substantially to their scores and others have but few. A general estimate of how strongly the dimensions incorporate the item scores is given in terms of the "percentage of item variance" for which the dimension accounted. This percentage is found immediately after the dimension title.

Job Dimensions

1. MAKING DECISIONS, COMMUNICATING, AND HAVING RESPONSIBILITY (16.5% of the variance)

This dimension is the most inclusive of all the dimensions, having substantial correlations with many of the job elements. Job activities and situations which involve high levels of reasoning, analysis, and decision making dominate this dimension. Additionally, communication activities and responsibility are important aspects of this dimension. Job elements (items) which are highly correlated with this dimension follow:

JOB ELEMENT	TITLE	CORRELATION
52.	Advising	.844
53.	Negotiating	.813
58.	Exchanging specialized information	.805
54.	Persuading	.792
34.	Combining information	.790
60.	Writing	.785
56.	Interviewing	.769
85.	Disagreements or conflict situations	.760
135.	Reasoning in problem solving	.757
69.	Middle management	.740
35.	Analyzing information	.730
83.	Unpleasant personal contacts	.729
134.	Decision making level	.728
68.	Executives or officials	.723
137.	Education	.722
136.	Amount of planning	.711
59.	Public speaking	.709
84.	Personal sacrifice in the service of others	.709
71.	Professional personnel	.704
146.	General responsibility	.700
67.	Serving as a staff member	.699
82.	Frustrating situations	.695
132.	Need to keep job knowledge current	.665
66.	Coordinating activities	.657
55.	Teaching	.652
148.	Job Structure	.638
11.	Observing the behavior of people or animals	.637
72.	Semi-professional personnel	.631
36.	Gathering, grouping, or classifying information	.624
149.	Critically of Position	.620
150.	Civic Obligations	.621
79.	Special interest groups	.582

JOB ELEMENT	TITLE	CORRELATION
86.	Distractions	.549
73.	Personnel engaged in office work	.539
147.	Supervision received	.530
77.	Students, trainees, or apprentices	.516
76.	The public generally	.515
140.	Level of mathematics	.496
33.	Estimating time	.485
143.	Personnel responsibility	.475
80.	Sales personnel	.473
14.	Listening to spoken information	.446
65.	Supervising non-employees	.444
1.	Reading	.435
95.	Technical devices	.432
120.	Traveling	.423
139.	Experience	.408
130.	Recognition	.391
142.	Supervision given	.390
131.	Vigilance	.362
138.	Training	.353
63.	Entertaining	.349
129.	Attention to detail	.347
74.	Purchasing agents	.346
26.	Judging condition or quality	.342
75.	Customers	.334
3.	Using graphic materials	.330
128.	Precision	.329
70.	Supervisors	.323
93.	Writing and drawing instruments	.322
37.	Coding or decoding	.319
30.	Estimating speed of processes	.313
13.	Viewing art, decorations, etc.	.305
99.	Keyboard devices	.302

2. OPERATING VEHICLES (5.4)

This dimension is characterized by job activities, work behaviors, or situations which are frequently associated with operating vehicles.

JOB ELEMENT	TITLE	CORRELATION
100.	Highway or rail vehicles	.714
114.	Working outdoors	.701
97.	Controls: Used continuously	.680
19.	Using distance vision	.645
20.	Using depth perception	.596
49.	Eye-hand/foot coordination	.565
9.	Observing features of nature	.554
29.	Estimating speed of moving objects	.545
10.	Observing or inspecting man-made feature of environment	.533
116.	Working with vibrating equipment	.516
101.	Powered mobile equipment	.454

JOB ELEMENT	TITLE	CORRELATION
120.	Traveling	.451
144.	Safety responsibility	.430
124.	Permanent total disability or death	.396
123.	Permanent injury or illness	.388
25.	Body balancing	.384
141.	Physical exertion	.357
122.	Injury or illness for 1 day or more but not permanent	.350
89.	Long-handle tools	.332
24.	Body movement sensing	.326

3. USING MACHINES, TOOLS, AND INSTRUMENTS (8.4)

This dimension is characterized by behaviors frequently associated with the use of machines, tools, and/or instruments.

JOB ELEMENT	TITLE	CORRELATION
41.	Assembing or dissembling	.732
38.	Setting up or adjusting equipment	.721
88.	Other hand tools	.693
48.	Hand-arm steadiness	.690
91.	Hand-held precision power tools	.678
92.	Other hand-held power tools	.639
40.	Controlling or guiding materials being processed	.634
6.	Using measuring devices	.584
90.	Handling devices or tools	.569
87.	Precision hand tools	.563
8.	Observing things you are working with	.545
96.	Processing machines and equipment	.542
98.	Controls: not used continuously	.531
28.	Estimating speed of moving parts	.525
47.	Hand-arm manipulation	.521
16.	Touching	.509
94.	Applicators	.508
7.	Observing and listening to mechanical devices in use	.481
39.	Using hands directly to change things	.471
105.	Operating equipment	.453
4.	Using patterns and related devices	.431
27.	Inspecting	.411
49.	Eye-hand coordination	.410
118.	Working under dirty conditions	.408
46.	Feeding/off-bearing	.389
141.	Physical exertion	.384
22.	Recognizing sound patterns	.371
23.	Recognizing sounds by loudness, tone, or pitch quality	.371
25.	Body balancing	.377
32.	Estimating size	.370
20.	Using depth perception	.367
44.	Highly-skilled body coordination	.342
95.	Technical devices	.340
3.	Using graphic materials	.335

JOB ELEMENT	TITLE	CORRELATION
89.	Long-handle tools	.334
30.	Estimating speed of processes	.326
104.	Man-moved mobile equipment	.323
21.	Using color perception	.322
26.	Judging condition or quality	.321
17.	Smelling	.318
11.	Kneeling or stooping	.313
119.	Working in awkward or small work spaces	.306
51.	Hand-ear coordination	.301
144.	Safety responsibility	.301
115.	Working in contaminated air	.300

4. PERFORMING PHYSICAL ACTIVITIES (2.6)

This dimension is characterized by activities involving body movement of various types.

JOB ELEMENT	TITLE	CORRELATION
109.	Walking or running	.611
43.	Physically handling objects, materials, animals, etc.	.584
104.	Man-moved mobile equipment	.533
107.	Sitting	.500
42.	Arranging or positioning	.483
11.	Kneeling or stooping	.477
141.	Physical exertion	.401
89.	Long-handle tools	.400
127.	Cycled work activities	.358
94.	Applicators	.347
108.	Standing	.315

5. OPERATING KEYBOARD AND OFFICE EQUIPMENT (2.7)

This dimension is characterized by activities and situations often found in an office environment involving clerical equipment and activities.

JOB ELEMENT	TITLE	CORRELATION
50.	Limb movement without visual control	.671
45.	Finger manipulation	.618
99.	Keyboard devices	.596
62.	Code communications	.476
107.	Sitting	.460
57.	Exchanging routine information	.438
51.	Hand-ear coordination	.423
73.	Personnel engaged in office work	.384
86.	Distractions	.369
39.	Using hands directly to change things	.357
37.	Coding or decoding	.353
108.	Standing	.351
36.	Gathering, grouping, or classifying information	.321

6. MONITORING AND/OR CONTROLLING EQUIPMENT AND/OR PROCESSES (3.1)

This dimension is characterized by the sensing of information which may be used to monitor and/or control equipment or processes.

JOB ELEMENT	TITLE	CORRELATION
15.	Listening to sounds-other than someone speaking	.645
5.	Using visual displays	.642
22.	Recognizing sound patterns	.637
23.	Recognizing sound by loudness, pitch or tone quality	.520
7.	Observing and listening to mechanical devices in use	.425
131.	Vigilance	.420
98.	Controls: not used continuously	.416
61.	Signaling	.415
12.	Observing the events or circumstances around you	.371
51.	Hand-ear coordination	.352
144.	Safety responsibility	.345
29.	Estimating speed of moving objects	.333
17.	Smelling	.330
28.	Estimating speed of moving parts	.309

7. WORKING UNDER UNCOMFORTABLE CONDITIONS (2.7)

This dimension is characterized by a variety of work conditions which require the workers to tolerate physically uncomfortable conditions.

JOB ELEMENT	TITLE	CORRELATION
117.	Working under poor lighting conditions	.643
115.	Working in contaminated air	.617
119.	Working in awkward or small work spaces	.615
112.	Working indoors in high temperatures	.605
118.	Working under dirty conditions	.542
113.	Working indoors in low temperatures	.512
116.	Working with vibrating equipment	.425
110.	Climbing	.414
111.	Kneeling or stooping	.322

8. WORKING WITH ART-DECOR/ENTERTAINMENT (1.8)

This dimension is characterized by a mix of somewhat related items having entertainment, public content, and/or artistic connotations.

JOB ELEMENT	TITLE	CORRELATION
63.	Entertaining	.518
65.	Supervising non-employees	.449
13.	Viewing art, decorations, etc.	.432
4.	Using patterns and related devices	.390
9.	Observing features of nature	.332
3.	Using graphic materials	.319
59.	Public speaking	.309

9. PERFORMING SUPERVISORY DUTIES (1.5)

This dimension is characterized by supervising or directing others and is also associated with job experience.

JOB ELEMENT	TITLE	CORRELATION
142.	Supervision given	.645
143.	Personnel responsibility	.632
139.	Experience	.336

10. PERFORMING ESTIMATING ACTIVITIES (1.7)

This dimension is characterized by various estimation activities including the estimation of quanitity, speed, conditions, size, or time.

JOB ELEMENT	TITLE	CORRELATION
31.	Estimating quanitity	.505
30.	Estimating speed of processes	.465
26.	Judging condition or quality	.402
32.	Estimating size	.402
27.	Inspecting	.392
33.	Estimating time	.378
8.	Observing things you are working with	.374

11. PROCESSING WRITTEN INFORMATION (2.6)

This dimension is dominated by the use of materials in written form although other forms of information also contribute to the dimension.

JOB ELEMENT	TITLE	CORRELATION
2.	Using numerical materials	.595
1.	Reading	.551
129.	Attention to detail	.526
128.	Precision	.511
140.	Level of mathematics	.470
132.	Need to keep job knowledge current	.404
93.	Writing and drawing instruments	.402
37.	Coding or decoding	.375
3.	Using graphic materials	.370
36.	Gathering, grouping, or classifying information	.320
14.	Listening to spoken information	.305

12. WORKING WITH BUYERS, CUSTOMERS, AND SALESPERSONS (1.4)

This dimension is dominated by contact with persons who are involved with buying and/or selling although other types of personnel also may be contacted.

JOB ELEMENT	TITLE	CORRELATION
74.	Purchasing agents	.591

75.	Customers	.500
81.	Skilled and unskilled workers	.373

13. WORKING UNDER HAZARDOUS CONDITIONS (2.3)

This dimension is characterized by working conditions where there are relatively high levels of physical danger to the worker.

JOB ELEMENT	TITLE	CORRELATION
122.	Injury or illness which would prevent work for one full day or more, but would not have permanent effects	.709
123.	Permanent injury or illness	.708
124.	Permanent total disability or death	.681
121.	Minor injury or illness which might result in a day or or less of lost time	.606
144.	Safety responsibility	.328

14. PERFORMING PACED AND/OR REPETITIVE ACTIVITIES

This dimension is characterized by activities which are performed at a specified pace and/or repetitive in nature.

JOB ELEMENT	TITLE	CORRELATION
125.	A set specified rate of work	.702
126.	Repetitive activities	.596
130.	Recognition	.282

15. WORKING WITH AERIAL AND ACQUATIC EQUIPMENT

This dimension is characterized by work involving powered water or air vehicles.

JOB ELEMENT	TITLE	CORRELATION
102.	Powered water vehicles	.590
103.	Air or space vehicles	.506
106.	Remote-controlled equipment	.390
24.	Body movement sensing	.304

16. CATERING, SERVING, SMELLING, AND TASTING (1.5)

This dimension is characterized by activities frequently involving the preparation and/or serving of food.

JOB ELEMENT	TITLE	CORRELATION
18.	Tasting	.675
17.	Smelling	.481
64.	Serving or catering	.455
90.	Handling devices or tools	.312

Source: Mecham, 1981

Appendix C

JAPQ

Job Activity Preference Questionnaire (JAPQ)

Robert C. Mecham, Alma F. Harris, Ernest J. McCormick, P. R. Jeanneret

The purpose of this questionnaire is to obtain a measure of your job interests or preferences. Each individual has different interests, so there are no right or wrong answers.

The questionnaire is divided into nine sections, each of the sections contains a listing of work activities or situations. For each section there is a rating scale that you are to use in rating how much you would want each of the work activities or situations to be a part of a job that you might sometime have.

In rating the work activities and situations, do not attempt to relate your responses directly to any specific job or occupation. Rather, consider each item separately, and indicate the level of your interest in the activity or situation as a part of any job that you might consider. As you rate each work activity or situation, assume that an opportunity would be available for you to get any required education or training.

Ordinarily, a separate answer sheet is used on which you mark your answers. If you are to use a separate answer sheet, MAKE NO MARKS ON THIS BOOKLET since it may be used again. Directions for completing the answer sheet are found on the answer sheet and should be closely followed. If the instructions are not clear, ask the person administering this questionnaire for help.

Several different methods may be used to analyze your answers. If the answers are to be sent away for processing, the separate optically scanned answer sheet must be completed. If answered directly through a computer terminal or manually scored the use of the optically scanned answer sheet is optional.

PERSONAL INFORMATION

(Complete this section ONLY if a separate answer sheet is not used.)

Last Name	First Name	Middle Name	Social Security Number	Year of Birth

Employer, if presently employed

Name _____

City _____ State _____

Occupation, if employed

Education (check one)

8 or less years	Some high school	High school graduate	Some college	College degree	Advanced degree
☐	☐	☐	☐	☐	☐

Vocational, technical, or related training (number of months)

School or college, if presently a student

Name _____

City _____ State _____

Present Date

Your Address: Street _____

City _____ State _____ Zip _____

Sex (check one)

Male ☐ Female ☐

Form X

SECTION 1

Information is needed to perform any type of work, and that information can come from many different sources. Use the numbers from 0 to 5 on the rating scale to mark how much you would like to use or engage in each of the following activities to get the "information" needed in your work. Mark the answer on the Optical Scanning Sheet (or enter the value on a computer terminal, or mark in the space provided if instructed to do so) which corresponds to the value you choose.

RATING SCALE
0 None
1 Very limited
2 Limited
3 Moderate
4 Considerable
5 Very extensive

EXAMPLE

Separate Optical Scanning Answer Sheet

1 0 1 2 ▌ 4 5

If answers are to be made in booklet

3 1. Reading (books, reports, office notes, job instructions, etc.)

_____ 1. Reading (books, reports, office notes, job instructions, etc.)

_____ 2. Using numerical materials (tables of numbers, accounts, specifications, price lists, etc.)

_____ 3. Using graphic materials (pictures, drawings, blueprints, diagrams, maps, tracings, X-ray films, TV pictures, etc.)

_____ 4. Using patterns and related devices (stencils, patterns, templates, etc.)

_____ 5. Using visual displays (dials, gauges, signal lights, radar scopes, speedometers, clocks, etc.)

_____ 6. Using measuring devices (rulers, calipers, tire pressure gauges, scales, thermometers, etc.)

_____ 7. Observing and listening to mechanical devices in use (tools, equipment, machinery, etc.)

_____ 8. Observing things you are working with (materials, parts or objects, such as bread dough being mixed, wood being cut, metal being welded, boxes being inventoried, items being inspected, etc.)

_____ 9. Observing features of nature (landscapes, fields, geological samples, plants, cloud formations, or other features of nature)

_____ 10. Observing or inspecting man-made features of the environment (buildings, dams, highways, bridges, docks, railroads, etc.)

_____ 11. Observing the behavior of people or animals

_____ 12. Observing the events or circumstances around you (flow of traffic, movement of materials, airport control tower operations, etc.)

_____ 13. Viewing art, decorations, etc. (paintings, sculpture, jewelry, window displays, etc.)

_____ 14. Listening to spoken information (instructions, conversations, interviews, meetings, discussions, etc.)

_____ 15. Listening to sounds—other than someone speaking (signals, horns, whistles, musical instruments, engine sounds, etc.)

_____ 16. Touching

_____ 17. Smelling

_____ 18. Tasting

SECTION 2

Rate how important you would like each of the following abilities and activities to be in your work. Again use the numbers 0 to 5.

RATING SCALE

0 No importance
1 Very minor
2 Low
3 Average
4 High
5 Extreme importance

_____ 19. Using distance vision (watching things at distances beyond arm's reach)

_____ 20. Using depth perception (judging the distance from yourself to an object, or the distance between objects, as in running a crane, operating a dentist's drill, etc.)

_____ 21. Using color perception (telling the difference between things by color)

_____ 22. Recognizing sound patterns (Morse code, heart beats, engine not running properly, etc.)

_____ 23. Recognizing sounds by loudness, pitch or tone quality (tuning pianos, repairing sound systems, etc.)

_____ 24. Body movement sensing (detecting changes in the direction or speed at which you are moving, without using sight or hearing, as in flying aircraft, working in a submarine, etc.)

_____ 25. Body balancing (walking on steel beams, climbing high poles, working on steep roofs, etc.)

_____ 26. Judging condition or quality (antique dealer, appraiser, jeweler, used car dealer, coin dealer, etc.)

_____ 27. Inspecting (grading or finding defects)

_____ 28. Estimating speed of moving parts (the revolutions per minute of a motor, the speed at which a lathe turns, etc.)

_____ 29. Estimating speed of moving objects (the speed of vehicles, speed of materials moving on a conveyor belt, etc.)

_____ 30. Estimating speed of processes (chemical reactions, assembly operations, timing of food preparation, etc.)

_____ 31. Estimating quantity (number of board feet of lumber in a log, weight of a steer, number of bacteria in an area by looking through a microscope, etc.)

_____ 32. Estimating size (height of a tree, measurements of a box, etc.)

_____ 33. Estimating time (time to make a delivery, to service a piece of equipment, etc.)

_____ 34. Combining information (weather forcaster using different pieces of information to preapre a weather report, pilot using different bits of information to fly a place, scientist developing a new theory, etc.)

_____ 35. Analyzing information (interpreting financial reports, determining why an automobile engine will not run, diagnosing an illness, etc.)

_____ 36. Gathering, grouping, or classifying information (preparing reports, filing correspondence, etc.)

_____ 37. Coding or decoding (reading Morse code, translating foreign languages, shorthand, etc.)

_____ 38. Setting up or adjusting equipment (setting up a lathe or drill press, adjusting an engine carburetor, etc.)

_____ 39. Using hands directly to change things (using the hands directly to change or alter or to modify people, materials, products, etc. For example, wrapping packages, forming pottery at a wheel, giving someone a massage, etc.)

_____ 40. Controlling or guiding materials being processed (operating a sewing machine, operating a jig saw, etc.

_____ 41. Assembling or disassembling (putting parts together to form a complete item, or taking an item apart)

_____ 42. Arranging or positioning (placing objects, materials, persons, animals, etc., in a specific position or arrangement)

RATING SCALE

0 No importance
1 Very minor
2 Low
3 Average
4 High
5 Extreme importance

_____ 43. Physically handling objects, materials, animals, human beings, etc. (loading or unloading trucks, farming activities, taking care of babies in a nursery, etc.)

_____ 44. Highly skilled body coordination activities (athletics, dancing, etc.)

_____ 45. Finger manipulation (making careful finger movements in various types of activities, such as in the use of precision tools, repairing watches, playing the piano, etc.)

_____ 46. Feeding/off-bearing (feeding materials into a machine or removing materials from a machine or piece of processing equipment)

_____ 47. Hand-arm manipulation (activities involving hand and arm movements, as might be used in repairing automobiles, packaging products, etc.)

_____ 48. Hand-arm steadiness (steady hand and arm movements, as might be necessary in using a welding torch or in performing surgery, etc.)

_____ 49. Eye-hand/foot coordination (the coordination of hand and/or foot movements with what is seen)

_____ 50. Limb movement without visual control (movement of body limbs from one position to another without the use of vision)

_____ 51. Hand-ear coordination (the coordination of hand movements with sounds or instructions that are heard)

_____ 52. Advising (using legal, financial, scientific, technical, clinical, spiritual, or other professional principles to counsel or guide individuals)

_____ 53. Negotiating (dealing with others to reach an agreement or solution, for example, labor bargaining, diplomatic relations, etc.)

_____ 54. Persuading (influencing others, as in selling or political campaigning)

_____ 55. Teaching

_____ 56. Interviewing

_____ 57. Exchanging routine information (giving and receiving routine information as might be done by a ticket agent, taxi-cab dispatcher, etc.)

_____ 58. Exchanging specialized information (giving and receiving specialized information, as might be done in a professional committee meeting, or as engineers might do when discussing a product design, etc.)

_____ 59. Public speaking

_____ 60. Writing (letters, reports, newspaper articles, etc.)

_____ 61. Signaling (hand signals, semaphore, whistles, horns, bells, lights, etc.)

_____ 62. Code communications (telegraph, cryptography, shorthand, etc.)

_____ 63. Entertaining (performing to amuse or entertain others)

_____ 64. Serving or catering (performing personal services, or attending to the needs of others, for example, waiting on tables, hairdressing, etc.)

_____ 65. Supervising non-employees (students, patients, campers, etc.)

_____ 66. Coordinating activities (social director, committee chairman, etc.)

_____ 67. Serving as a staff member (advising, consulting, and giving other types of assistance to management personnel, for example, legal adviser, accountant, etc.)

SECTION 3

Different jobs require you to associate with different types of individuals. How important would you want personal contact with the following types of individuals to be? Continue using the same rating scale.

RATING SCALE

0 No importance
1 Very minor
2 Low
3 Average
4 High
5 Extreme importance

_____ 68. Executives or officials (government administrators, corporation vice-presidents, plant superintendents, etc.)

_____ 69. Middle management (division or district managers)

_____ 70. Supervisors (first level supervisors, office managers, etc.)

_____ 71. Professional personnel (doctors, lawyers, scientists, engineers, professors, teachers, etc.)

_____ 72. Semi-professional personnel (technicians, draftsmen, designers, photographers, surveyors, etc.)

_____ 73. Personnel engaged in office work (clerks, bookkeepers, receptionists, etc.)

_____ 74. Purchasing agents (individuals who buy for companies)

_____ 75. Customers (as in stores or restaurants)

_____ 76. The public generally (such as with whom police officers, park attendants, etc. might come in contact)

_____ 77. Students, trainees, or apprentices

_____ 78. Clients, patients, or individuals being counseled

_____ 79. Special interest groups (stockholders, property owners, lobbyists, etc.)

_____ 80. Sales personnel

_____ 81. Skilled and unskilled workers

SECTION 4

Following are five job situations or circumstances. Use the numbers from 0 to 5 to indicate how much of each you would be willing to accept in your work.

RATING SCALE

0 None
1 Very little
2 Little
3 Moderate amount
4 Considerable
5 Large amount

_____ 82. Frustrating situations (situations in which you would become frustrated because your attempts to do something might be hindered or obstructed)

_____ 83. Unpleasant personal contacts (some types of police work, handling certain mental patients, etc.)

_____ 84. Personal sacrifice in the service of others (as might be required by a policeman, minister of religion, social worker, etc.)

_____ 85. Disagreements or conflict situations (as might be involved in labor negotiations, enforcement of an unpopular policy, etc.)

_____ 86. Distractions (telephone calls, interruptions and disturbances from others, etc.)

SECTION 5

Use the numbers from 0 to 5 to indicate <u>how much</u> you would like to use each of the following devices or pieces of equipment in your work.

RATING SCALE
0 None
1 Very limited
2 Limited
3 Moderate
4 Considerable
5 Very extensive

_____ 87. Precision hand tools (engraver's tools, watchmaker's tools, surgical instruments, etc.)

_____ 88. Other hand tools (hammers, wrenches, knives, scissors, etc.)

_____ 89. Long-handle tools (hoes, rakes, shovels, picks, axes, brooms, etc.)

_____ 90. Handling devices or tools (tongs, ladles, dippers, forcepts, etc., used for moving or handling objects and materials)

_____ 91. Hand-held precision power tools (dentist drills, welding equipment, etc.)

_____ 92. Other hand-held power tools (ordinary power saws, drills, sanders, clippers, etc.)

_____ 93. Writing and drawing instruments (pens, pencils, artist's brushes, drafting equipment, etc.)

_____ 94. Applicators (brushes, rags, paint rollers, used in applying solutions, materials, etc.)

_____ 95. Technical devices (cameras, stopwatches, slide rules, etc.)

_____ 96. Processing machines and equipment (used to process or modify parts, objects, materials, etc.)

_____ 97. Controls: used continuously (controls requiring continuous adjustment or manipulation, for example, accelerator, steering wheel, etc.)

_____ 98. Controls: not used continuously (controls used to start or stop, to set positions on a machine, etc.)

_____ 99. Keyboard devices (pianos, typewriters, adding machines, etc.)

_____ 100. Highway or rail vehicles (automobiles, trucks, buses, trains, etc.)

_____ 101. Powered mobile equipment (fork lifts, self-propelled lawn mowers, road graders, tractors, etc.)

_____ 102. Powered water vehicles (ships, submarines, motor boats, etc.)

_____ 103. Air or space vehicles (planes, helicopters, balloons, gliders, rocketships, etc.)

_____ 104. Man-moved mobile equipment (hand-pushed lawn mowers, wheel barrows, floor polishers, etc.)

_____ 105. Operating equipment (cranes, hoists, elevators, etc.)

_____ 106. Remote-controlled equipment (conveyor systems, etc.)

SECTION 6

Use the numbers from 0 to 5 to indicate how much of your working time you would be willing to spend in the following activities or under the following circumstances.

RATING SCALE
0 None
1 Under 1/10 of the time
2 Between 1/10 and 1/3 of the time
3 Between 1/3 and 2/3 of the time
4 Over 2/3 of the time
5 Almost continually

_____107. Sitting

_____108. Standing

_____109. Walking or running

_____110. Climbing (for example, house painter, telephone line repair, etc.)

_____111. Kneeling or stooping (or other body positions which may be uncomfortable or awkward)

_____112. Working indoors in high temperatures (conditions in which you may be uncomfortable, such as in boiler rooms, around furnaces, etc.)

_____113. Working indoors in low temperatures (conditions in which you would be definitely cold even though you wore heavy clothing, such as in refrigerated rooms, etc.)

_____114. Working outdoors (under different weather conditions)

_____115. Working in contaminated air (dust, fumes, smoke, bad odors, etc.)

_____116. Working with vibrating equipment (equipment that vibrates the whole body or body limbs (driving a tractor or truck, operating an air hammer, etc.)

_____117. Working under poor lighting conditions (not enough light, excessive glare, etc.)

_____118. Working under dirty conditions (garages, foundries, coal mines, highway construction, furnace cleaning, etc.)

_____119. Working in awkward or small work spaces (conditions in which the body is cramped or uncomfortable)

_____120. Traveling (which requires one to be away from home overnight or longer)

SECTION 7

Below are descriptions of 4 degrees of injury, ranging from minor to very serious. Use the numbers from 0 to 5 to indicate the "risk" (or the possibility) of each occurring that you would be willing to accept as a part of your work.

RATING SCALE
0 No possibility
1 Very limited possibility
2 Limited possibility
3 Moderate possibility
4 Fairly high possibility
5 High possibility

_____121. Minor injury or illness which might result in a day or less of lost time

_____122. Injury or illness which would prevent work for one full day or more, but which would not have any permanent effects

_____123. Permanent injury or illness (resulting in the loss of an arm, leg, hearing, sight of one eye, etc.)

_____124. Permanent total disability or death (injury or illness which would result in disability for life, or in death)

SECTION 8

Following is a list of job requirements. Use the numbers from 0 to 5 to rate how much you would want each to be a part of your work.

RATING SCALE
0 None (No part)
1 Very limited
2 Limited
3 Moderate
4 Considerable
5 Very extensive

_____125. **A set specified rate of work (assembly line, etc.)**

_____126. **Repetitive activities (repeating the same activity, without interruption, for periods of time)**

_____127. **Cycled work activities (working according to a schedule which repeats weekly, daily, or hourly, such as a postal carrier or milk truck driver delivering on a route, a guard patrolling a beat, etc.)**

_____128. **Precision (need to be more than normally precise and accurate)**

_____129. **Attention to detail**

_____130. **Recognition (need to identify certain objects, events, processes, behavior, etc.)**

_____131. **Vigilance (need to be constantly alert and aware of any changes in a situation)**

_____132. **Need to keep job knowledge current (continually learning new developments related to the job)**

SECTION 9

Select one of the responses for each of the following questions.

_____133. Competition: How important would you want competition with other individuals or groups to be in your work (for such things as promotions, financial rewards, recognition, etc.)

1. Very minor importance
2. Minor importance
3. Moderate importance
4. High importance
5. Extreme importance

_____134. Decision making level: What level of decisions would you want to make in your work?

1. Low level decisions (such as must be made in pasting labels on cartons, putting items on shelves in a warehouse, etc.)
2. Below average level decisions (such as those made in running a wood planer, greasing a car, or dispatching a taxi)
3. Average level decisions (such as in ordering office supplies several months in advance, determining what is wrong with an automobile engine, setting up machine tools for operation, etc.)
4. Above average level decisions (such as deciding who will be promoted, who will be hired or fired, if property will be purchased, etc.)
5. High level decisions (such as recommending major surgery, selecting the location for a new plant, or approving a corporation's annual budget)

_____135. Reasoning in problem solving: Which of the following reasoning levels would you want your work to require?

1. Low (use of common sense to carry out uninvolved instructions, as might be done by a janitor or a deliveryperson)
2. Below average (use of some experience or training, such as a sales clerk, a postal carrier, a keypunch operator, or an electrician's apprentice might use)
3. Average (use of principles to solve practical problems, such as might be required in farming, drafting or carpentry)
4. Above average (use of logic or scientific thinking, as might be used by a mechanical engineer, a personnel director, or the manager of a store, etc.)
5. High (use of principles of logic or scientific thinking to solve a wide range of problems, as might be done by a research chemist, a nuclear engineer, a corporate president, or the manager of a large plant)

_____136. Amount of planning: How much planning or scheduling would you like to do in your work?

0. None
1. Very little (little planning of your own activities, as in selling tickets at a theater, working on an assembly line, etc.)
2. Little (some planning required, but not a great deal, as in delivering milk, working as a janitor, etc.)
3. Average amount (for example, a carpenter who must plan the best way to build a house, the planning that must be done by a taxi dispatcher, etc.)
4. Considerable (for example, a supervisor who must plan what the workers must do, a teacher who must prepare lectures or lesson plans, etc.)
5. Large amount (for example, a department store manager, an executive who must plan the activities of different groups, an architect, etc.)

_____137. Education: How much education would you want your work to require?

0. Little or none
1. Less than high school
2. High school diploma
3. Some college education
4. College degree
5. Advanced degree (M.S., Ph.D., M.D., L.L.D., etc.)

_____138. Training: How much training, other than the education in number 137, would you want your work to require? Consider such things as on-the-job training, apprentice training, technical and vocational schools, and orientation training.

0. 1 day or less
1. Over 1 day up to 1 month
2. Between 1 and 6 months
3. Between 6 months and 1 year
4. Between 1 and 3 years
5. Over 3 years

_____139. Experience: How much experience in related or lower-level jobs would you like your work to require?

1. Less than 1 month
2. Less than 1 year
3. Between 1 and 3 years
4. Between 3 and 5 years
5. Over 5 years

_____140. Level of mathematics: What is the highest level of mathematics you would want your job to require?

0. None
1. Simple counting, addition and subtraction of numbers smaller than 100
2. Addition and subtraction of numbers up to 1,000 and some multiplication and division
3. Use of fractions, decimals, percentages
4. Use of algebra, geometry, trigonometry, or statistics
5. Advanced use of calculus, topology, vector analysis, factor analysis, probability theory, etc

_____141. **Physical exertion: How much physical effort would you want your work to require?**

1. **Very light (occasional walking or standing, occasionally moving light objects, as might be required of a secretary, watchmaker, telephone operator, etc.)**
2. **Light (frequently walking or standing and often exerting effort equal to that which would be required to lift between 10 and 20 pounds, as might be done by a sales clerk, bank teller, etc.)**
3. **Moderate (frequently exerting effort equal to that which would be required to lift between 25 and 50 pounds, for example, auto mechanic, coin vending machine serviceperson, bus driver, etc.)**
4. **Heavy (lifting between 50 and 100 pounds, for example, general laborer, bulldozer operator, baggage porter, etc.)**
5. **Very heavy (frequently using enough effort to lift 50 pounds, and occasionally using enough effort to lift over 100 pounds, for example, quarry mining, setting up concrete forms, etc.)**

_____142. **Supervision given: How many workers would you want to directly supervise?**

0. **None**
1. **1 or 2 workers**
2. **3 to 5 workers**
3. **6 to 8 workers**
4. **9 to 12 workers**
5. **13 or more workers**

_____143. **Personnel responsibility: How many personnel would you want to be responsible for in your work? As an example, a president of a corporation would be responsible for everyone who worked for the corporation.**

0. None
1. 10 or fewer workers
2. 11 to 50 workers
3. 51 to 250 workers
4. 251 to 750 workers
5. 751 or more workers

_____144. **Safety responsibility: How much responsibility for the safety of others would you be willing to assume in your work?**

0. None
1. Little (working only with small hand tools, machines that are not dangerous, etc.)
2. Limited (responsible to exercise only reasonable care)
3. Intermediate (must be careful to avoid hurting others, as in operating overhead cranes, driving vehicles, etc.)
4. Substantial (must constantly be careful not to injure others, as in handling dangerous chemicals or explosives, etc.)
5. Very substantial (the safety of others would depend entirely upon you, as in piloting an aircraft, performing major surgery, etc.)

_____145. **Property responsibility: How much property would you be willing to assume responsibility for?**

1. **Very little (a few dollars worth)**
2. **Little ($50.00 to $500.00 worth)**
3. **Moderate amount ($501.00 to $5,000.00 worth)**
4. **Substantial amount ($5,001.00 to $25,000.00 worth)**
5. **Very substantial amount (more than $25,000.00 worth)**

_____146. **General responsibility: How much general responsibility would you want in your work?**

1. **Very little**
2. **Little**
3. **Average amount**
4. **Substantial**
5. **Very substantial**

_____147. **Supervision received: How much supervision would you want to receive in your work?**

1. **Close supervision, including job assignments and close observation of work**
2. **General supervision**
3. **General guidance, but quite independent of others**
4. **Very little direction or guidance**
5. **No supervision**

_____148. **Job structure: To what extent would you want to follow a routine, or have your work outlined for you?**

1. **Almost no change from a predetermined job routine (working on an assembly line, etc.)**
2. **Little change from the work routine possible (bookkeeping, stocking items in a warehouse, etc.)**
3. **Certain work must be done, but you can determine your own schedule or routine (carpenter, automobile mechanic, machinist, etc.)**
4. **Little routine work (most of the decisions made by you, for example, store manager, industrial engineer, etc.)**
5. **No routine (a wide variety of problems must be dealt with, and you would determine your own solutions, for example, corporation vice-president, research chemist, etc.)**

_____149. Criticality of position: Some positions in a company are especially critical. If not filled properly, such things as the company's earnings or reputation might seriously suffer. With this in mind, what degree of criticality would you want your job or position to have?

1. Very low
2. Low
3. Moderate
4. High
5. Very high

_____150. Civic Obligations: How important would you want civic obligations to be in your work (assisting charitable organizations, belonging to citizen committees, and serving in other non-paying public service capacities)

0. No importance
1. Very minor
2. Low
3. Average
4. High
5. Extreme importance

If you are <u>not</u> using the Optical Scanning Answer Sheet and your answers will <u>not</u> be computer analyzed you are now finished. Otherwise, proceed to the "Selected Comparisons" section on the back page.

SELECTED COMPARISONS

If you are using the computer analyzed answer sheet, proceed to select from the Occupational Divisions listed below the three two-digit numbers associated with occupations you might seriously consider choosing. Enter the three two-digit numbers in the area of the answer sheet designated for "selected comparisons."

Two-Digit Occupational Divisions

(As taken from the *Dictionary of Occupational Titles (DOT)*, Fourth Edition)

PROFESSIONAL, TECHNICAL AND MANAGERIAL OCCUPATIONS

00/01 Occupations in architecture, engineering and surveying
02 Occupations in mathematics and physical sciences
04 Occupations in life sciences
05 Occupations in social sciences
07 Occupations in medicine and health
09 Occupations in education
10 Occupations in museum, library and archival sciences
11 Occupations in law and jurisprudence
12 Occupations in religion and theology
13 Occupations in writing
14 Occupations in art
15 Occupations in entertainment and recreation
16 Occupations in administrative specializations
18 Managers and officials, n.e.c.
19 Miscellaneous professional, technical and managerial occupations

CLERICAL AND SALES OCCUPATIONS

20 Stenography, typing, filing and related occupations
21 Computing and account-recording occupations
22 Production and stock clerks and related occupations
23 Information and message distribution occupations
24 Miscellaneous clerical occupations
25 Sales occupations, services
26 Sales occupations, consumable commodities
27 Sales occupations, commodities, n.e.c.
29 Miscellaneous sales occupations

SERVICE OCCUPATIONS

30 Domestic service occupations
31 Food and beverage preparation and service occupations
32 Lodging and related service occupations
33 Barbering, cosmetology, and related service occupations
34 Amusement and recreation service occupations
35 Miscellaneous personal service occupations
36 Apparel and furnishings service occupations
37 Protective service occupations
38 Building and related service occupations

AGRICULTURAL, FISHERY, FORESTRY AND RELATED OCCUPATIONS

40 Plant farming occupations
41 Animal farming occupations
42 Miscellaneous agricultural and related occupations
44 Fishery and related occupations
45 Forestry occupations
46 Hunting, trapping and related occupations

PROCESSING OCCUPATIONS

50 Occupations in processing of metal
51 Ore refining and foundry occupations
52 Occupations in processing of food, tobacco and related products
53 Occupations in processing of paper and related materials
54 Occupations in processing of petroleum, coal, natural and manufactured gas, and related products
55 Occupations in processing of chemicals, plastics, synthetics, rubber, paint and related products
56 Occupations in processing of wood and wood products
57 Occupations in processing of stone, clay, glass and related products
58 Occupations in processing of leather, textiles and related products
59 Processing occupations, n.e.c.

MACHINE TRADES OCCUPATIONS

60 Metal machining occupations
61 Metalworking occupations, n.e.c.
62/63 Mechanics and machinery repairers
64 Paperworking occupations
65 Printing occupations
66 Wood machining occupations
67 Occupations in machining stone, clay, glass and related materials
68 Textile occupations
69 Machine trades occupations, n.e.c.

BENCHWORK OCCUPATIONS

70 Occupations in fabrication, assembly and repair of metal products, n.e.c.
71 Occupations in fabrication and repair of scientific, medical, photographic, optical, horological and related products
72 Occupations in assembly and repair of electrical equipment
73 Occupations in fabrication and repair of products made from assorted materials
74 Painting, decorating and related occupations
75 Occupations in fabrication and repair of plastics, synthetics, rubber and related products
76 Occupations in fabrication and repair of wood products
77 Occupations in fabrication and repair of sand, stone, clay and glass products
78 Occupations in fabrication and repair of textile, leather and related products
79 Benchwork occupations, n.e.c.

STRUCTURAL WORK OCCUPATIONS

80 Occupations in metal fabricating, n.e.c.
81 Welders, cutters and related occupations
82 Electrical assembling, installing and repairing occupations
84 Painting, plastering, waterproofing, cementing and related occupations
85 Excavating, grading, paving and related occupations
86 Construction occupations, n.e.c.
89 Structural work occupations, n.e.c.

MISCELLANEOUS OCCUPATIONS

90 Motor freight occupations
91 Transportation occupations, n.e.c.
92 Packaging and materials handling occupations
93 Occupations in extraction of minerals
95 Occupations in production and distribution of utilities
96 Amusement, recreation, motion picture, radio and television occupations, n.e.c.
97 Occupations in graphic art work

Acknowledgment: Appreciation is expressed to the U.S. Department of Labor, Employment Training Administration, U.S. Employment Service for the use of the two-digit occupational divisions listed on this page.

Appendix D

High Producers Descriptive Data

Appendix D

High Producers Descriptive Data

Employee	Tenure	Output	Age	Employee	Tenure	Output	Age
1	6	896	29	18	24	980	23
2	8	899	32	19	27	1073	29
3	11	947	31	20	28	1200	23
4	11	936	26	21	30	858	36
5	12	866	20	22	30	1108	33
6	14	856	21	23	30	1077	24
7	15	1011	20	24	30	858	36
8	16	1121	24	25	32	1029	21
9	18	1081	30	26	33	1043	27
10	18	822	23	27	33	964	33
11	19	1000	21	28	36	926	22
12	20	1000	24	29	36	1060	34
13	20	1022	26	30	39	869	27
14	21	950	22	31	39	869	27
15	21	1135	23	32	42	981	25
16	22	1000	24	33	44	1074	23
17	22	1200	23				

Median Tenure = 24 months

$\overline{X}$ Output = 993.06 pieces per hour

$\overline{X}$ Age = 26.12 years

Appendix E

Low Producers Descriptive Data

Appendix E

Low Producers Descriptive Data

Employee	Tenure	Output	Age
1	4	625	22
2	5	635	20
3	6	579	24
4	6	664	25
5	6	653	30
6	8	629	31
7	9	665	23
8	9	700	29
9	9	730	32
10	10	700	33
11	11	699	29
12	15	735	23
13	18	698	54
14	19	703	21
15	20	707	34
16	21	703	41
17	21	780	21
18	21	790	21
19	22	698	20
20	22	720	26
21	24	801	23
22	28	651	27
23	29	731	32
24	44	756	32
25	46	760	24
26	144	768	59
27	156	804	49

Median Tenure = 19 months

$\overline{X}$ output = 706.81 pieces per hour

$\overline{X}$ age = 29.81 years

Appendix F

Long Tenured Descriptive Data

Appendix F

Long Tenured Descriptive Data

Employee	Tenure	Output	Age	Employee	Tenure	Output	Age
1	18	698	54	21	28	651	27
2	18	882	23	22	28	1200	23
3	18	1081	30	23	29	731	32
4	19	703	21	24	30	858	36
5	19	1000	21	25	30	1108	33
6	20	1022	26	26	30	1077	24
7	20	1000	24	27	30	858	36
8	20	707	34	28	32	1029	21
9	21	703	41	29	33	964	33
10	21	780	21	30	33	1043	27
11	21	790	21	31	36	1060	34
12	21	950	22	32	36	926	22
13	21	1135	23	33	39	869	27
14	22	720	26	34	39	869	27
15	22	698	20	35	42	981	25
16	22	1000	24	36	44	1074	23
17	22	1200	23	37	44	756	32
18	24	980	23	38	46	760	24
19	24	801	23	39	144	768	59
20	27	1073	29	40	156	804	49

Median Tenure = 27.50 months

$\overline{X}$ Output = 907.73 pieces per hour

$\overline{X}$ Age = 28.58 years

Appendix G

Short Tenured Descriptive Data

Appendix G

Short Tenured Descriptive Data

Employee	Tenure	Output	Age
1	4	625	22
2	5	635	20
3	6	653	30
4	6	664	25
5	6	579	24
6	6	896	29
7	8	899	32
8	8	629	31
9	9	730	32
10	9	665	23
11	9	700	29
12	10	700	33
13	11	699	29
14	11	947	31
15	11	936	26
16	12	866	20
17	14	856	21
18	15	735	23
19	15	1011	20
20	16	1121	24

Median = 9.25 months

$\overline{X}$ output = 772.30 pieces per hour

$\overline{X}$ age = 26.2 years

Appendix H

PAQ-JAPQ Item Conversion

Appendix H

PAQ-JAPQ Item Conversion

JAPQ #	PAQ #	JAPQ #	PAQ #	JAPQ #	PAQ #	JAPQ #	PAQ #
1	1	41	81	81	119	121	144
2	2	42	82	82	149	122	143
3	3	43	84	83	150	123	146
4	4	44	85	84	151	124	147
5	5	45	93	85	152	125	169
6	6	46	83	86	179	126	170
7	7	47	94	87	53	127	171
8	8	48	95	88	54	128	174
9	10	49	96	89	52	129	175
10	11	50	97	90	51	130	176
11	12	51	98	91	50	131	177
12	13	52	99	92	55	132	180
13	14	53	100	93	56	133	*
14	15	54	101	94	57	134	36
15	16	55	102	95	59	135	37
16	17	56	103	96	61	136	38
17	18	57	104	97	62	137	46
18	19	58	105	98	63	138	48
19	20	59	106	99	65	139	47
20	22	60	107	100	71	140	49
21	23	61	108	101	72	141	87
22	24	62	109	102	73	142	128
23	25	63	110	103	74	143	129
24	26	64	111	104	75	144	183
25	27	65	131	105	76	145	184
26	28	66	132	106	77	146	185
27	32	67	133	107	88	147	134
28	28	68	113	108	89	148	186
29	29	69	114	109	90	149	187
30	30	70	115	110	91	150	148
31	31	71	116	111	92		
32	34	72	117	112	136		
33	35	73	118	113	137		
34	39	74	121	114	135		
35	40	75	122	115	138		
36	41	76	123	116	139		
37	42	77	124	117	140		
38	78	78	125	118	141		
39	79	79	126	119	142		
40	80	80	120	120	182		

Appendix I

PAQ Analyst Results

Appendix I

PAQ Analyst Results

PAQ Item #	$\overline{X}$	S_D	Analysts' Responses
1*	4.4	0.5	5-4-5-4-4-4-5
2	4.0	0.8	3-3-4-4-5-4-5
3	1.0	0.0	1-1-1-1-1-1-1
4	0.3	0.7	0-0-0-0-2-0-0
5	3.4	0.5	3-3-3-4-3-4-4
6	0.0	0.0	0-0-0-0-0-0-0
7	4.6	0.5	4-5-4-5-4-5-5
8	0.3	0.4	1-0-1-0-0-0-0
9	3.9	0.8	3-3-4-4-3-5-5
10	0.0	0.0	0-0-0-0-0-0-0
11	0.0	0.0	0-0-0-0-0-0-0
12	0.9	0.8	2-1-2-0-0-0-1
13	1.3	1.2	2-3-2-0-2-0-0
14	0.0	0.0	0-0-0-0-0-0-0
15	2.7	0.7	2-2-2-3-3-3-4
16	1.7	1.2	1-0-1-4-2-2-2
17	4.3	0.7	4-4-3-5-4-5-5
18	0.0	0.0	0-0-0-0-0-0-0
19	0.0	0.0	0-0-0-0-0-0-0
20	3.7	0.4	3-4-3-4-4-4-4
22	0.9	1.0	1-3-1-0-0-0-1
23	0.0	0.0	0-0-0-0-0-0-0
24	0.7	0.7	1-2-1-0-0-0-1
25	0.0	0.0	0-0-0-0-0-0-0
26	0.1	0.3	0-0-1-0-0-0-0
27	0.9	1.0	2-2-2-0-0-0-0
28	0.0	0.0	0-0-0-0-0-0-0
29	1.1	1.4	0-0-0-3-3-2-0
30	0.9	1.0	2-2-2-0-0-0-0
31	0.0	0.0	0-0-0-0-0-0-0
32	1.7	0.9	1-1-1-3-3-2-1
34	0.0	0.0	0-0-0-0-0-0-0
35	2.4	0.5	2-2-2-3-3-2-3
36	2.0	0.5	2-2-2-2-3-2-1
37	2.0	0.0	2-2-2-2-2-2-2
38	0.7	0.4	1-0-1-1-1-0-1
39	0.4	0.7	0-0-0-0-2-0-1
40	0.1	0.3	0-0-0-0-1-0-0
41	1.3	0.4	2-2-1-1-1-1-1
42	0.0	0.0	0-0-0-0-0-0-0
46	2.0	0.0	2-2-2-2-2-2-2
47	2.1	0.3	2-3-2-2-2-2-2
48	1.7	0.4	2-1-2-2-1-2-2
49	1.9	0.3	2-1-2-2-2-2-2
50	0.0	0.0	0-0-0-0-0-0-0
51	0.0	0.0	0-0-0-0-0-0-0

PAQ Item #	$\bar{X}$	S_D	Analysts' Responses
52	0.0	0.0	0-0-0-0-0-0-0
53	0.0	0.0	0-0-0-0-0-0-0
54	0.0	0.0	0-0-0-0-0-0-0
55	0.0	0.0	0-0-0-0-0-0-0
56	0.1	0.3	0-0-0-0-1-0-0
57	0.0	0.0	0-0-0-0-0-0-0
59	0.0	0.0	0-0-0-0-0-0-0
61	3.3	0.4	3-4-4-3-3-3-3
62	3.7	0.7	3-3-4-5-3-4-4
63	1.0	1.1	1-1-2-0-3-0-0
65	5.0	0.0	5-5-5-5-5-5-5
71	0.0	0.0	0-0-0-0-0-0-0
72	0.0	0.0	0-0-0-0-0-0-0
73	0.0	0.0	0-0-0-0-0-0-0
74	0.0	0.0	0-0-0-0-0-0-0
75	0.0	0.0	0-0-0-0-0-0-0
76	0.0	0.0	0-0-0-0-0-0-0
77	0.0	0.0	0-0-0-0-0-0-0
78	0.6	0.5	1-1-1-0-1-0-0
79	0.9	0.8	1-1-2-0-2-0-0
80	1.9	0.6	2-2-2-1-3-1-2
81	1.3	1.2	2-2-2-0-3-0-0
82	2.9	0.6	3-3-2-3-4-2-3
83	2.0	0.8	2-2-1-3-3-2-1
84	4.1	0.6	4-4-4-4-3-5-5
85	2.9	0.3	3-2-3-3-3-3-3
87	1.1	0.3	1-2-1-1-1-1-1
88	4.9	0.3	5-4-5-5-5-5-5
89	0.9	0.3	1-0-1-1-1-1-1
90	1.1	0.3	1-2-1-1-1-1-1
91	0.0	0.0	0-0-0-0-0-0-0
92	0.6	0.5	1-1-1-1-0-0-0
93	4.7	0.4	5-5-5-4-5-4-5
94	4.0	0.0	4-4-4-4-4-4-4
95	4.3	0.4	4-4-4-5-5-4-4
96	4.4	0.5	4-4-4-5-4-5-5
97	4.4	0.7	5-5-4-5-3-5-4
98	1.3	0.4	2-2-1-1-1-1-1
99	0.0	0.0	0-0-0-0-0-0-0
100	0.9	0.3	1-1-1-1-0-1-1
101	1.0	0.5	1-1-1-1-0-1-2
102	0.1	0.3	0-0-0-0-0-0-0
103	0.0	0.0	0-0-0-0-0-0-0
104	1.6	0.5	2-2-2-2-1-1-1
105	0.4	0.5	0-0-0-0-1-1-1
106	0.1	0.3	0-0-0-0-1-0-0
107	0.0	0.0	0-0-0-0-0-0-0
108	0.0	0.0	0-0-0-0-0-0-0
109	0.0	0.0	0-0-0-0-0-0-0

PAQ Item #	$\bar{X}$	S_D	Analysts' Responses
110	0.0	0.0	0-0-0-0-0-0-0
111	0.0	0.0	0-0-0-0-0-0-0
113	0.9	0.3	1-1-1-1-0-1-1
114	2.3	0.4	2-2-2-3-2-3-2
115	4.9	0.3	5-5-5-5-4-5-5
116	0.0	0.0	0-0-0-0-0-0-0
117	0.0	0.0	0-0-0-0-0-0-0
118	3.7	0.4	4-4-4-4-4-3-3
119	0.0	0.0	0-0-0-0-0-0-0
120	0.0	0.0	0-0-0-0-0-0-0
121	0.0	0.0	0-0-0-0-0-0-0
122	0.0	0.0	0-0-0-0-0-0-0
123	0.0	0.0	0-0-0-0-0-0-0
124	1.4	0.5	2-2-1-1-1-1-2
125	0.0	0.0	0-0-0-0-0-0-0
126	0.0	0.0	0-0-0-0-0-0-0
128	0.0	0.0	0-0-0-0-0-0-0
129	0.0	0.0	0-0-0-0-0-0-0
131	0.0	0.0	0-0-0-0-0-0-0
132	0.0	0.0	0-0-0-0-0-0-0
133	0.0	0.0	0-0-0-0-0-0-0
134	2.3	0.4	2-2-3-2-3-2-2
135	0.0	0.0	0-0-0-0-0-0-0
136	0.1	0.3	0-0-0-0-1-0-0
137	0.1	0.3	0-0-0-0-1-0-0
138	0.0	0.0	0-0-0-0-0-0-0
139	0.0	0.0	0-0-0-0-0-0-0
140	0.0	0.0	0-0-0-0-0-0-0
141	0.0	0.0	0-0-0-0-0-0-0
142	1.7	1.3	3-3-3-0-0-1-2
143	3.0	0.0	3-3-3-3-3-3-3
144	0.9	0.3	1-1-1-1-0-1-1
146	0.0	0.0	0-0-0-0-0-0-0
147	0.0	0.0	0-0-0-0-0-0-0
148	0.0	0.0	0-0-0-0-0-0-0
149	1.3	1.1	1-2-2-0-0-1-3
150	0.0	0.0	0-0-0-0-0-0-0
151	0.0	0.0	0-0-0-0-0-0-0
152	0.3	0.4	0-0-0-0-0-1-1
169	4.3	0.7	4-4-5-3-5-4-5
170	4.9	0.3	5-4-5-5-5-5-5
171	1.1	0.3	1-1-1-2-1-1-1
174	4.1	0.6	5-4-4-5-4-4-3
175	3.7	0.4	4-3-3-4-4-4-4
176	2.0	0.8	1-2-2-1-3-3-2
177	0.9	0.6	1-1-1-0-2-1-0
179	1.3	0.4	1-1-1-1-2-1-2
180	3.0	0.5	3-3-3-2-4-3-3
182	0.0	0.0	0-0-0-0-0-0-0

PAQ Item #	$\bar{X}$	S_D	Analysts' Responses
183	0.1	0.3	0-0-0-0-1-0-0
184	2.3	0.7	2-2-2-4-2-2-2
185	3.6	0.7	4-4-3-5-3-3-3
186	1.3	0.4	1-1-1-2-2-1-1
187	4.1	0.6	4-4-4-3-4-5-5

*Results are shown for PAQ items used with the JAPQ

Appendix J

JAPQ Dimension Preferences "Keyer"

Appendix J

JAPQ Dimension Preferences "Keyer"

Dimension	z-score	Standard Deviation
1	1.148	0.657
2	0.297	0.604
3	1.062	0.831
4	-0.127	0.701
5	1.019	0.713
6	0.103	0.701
7	-0.421	1.316
8	1.647	0.996
9	0.491	0.831
10	0.017	0.891
11	-1.518	0.770
12	1.361	0.958
13	-0.833	1.263
14	0.322	0.775
15	2.010	1.385
16	1.656	1.348
JAPQ-D^2	6.558	3.539

Appendix K

Dimension Job Analysis vs. Keyer Dimension Preference

Appendix K

Dimension Job Analysis vs. Keyer Dimension Preference

Dimnension	PAQ z-score	Keyers' z-score	Difference
1	-0.80	1.15	1.95
2	0.00	0.30	0.30
3	0.20	1.06	0.86
4	-0.90	-0.13	0.77
5	1.40	1.02	-0.38
6	0.10	0.10	0.00
7	-0.20	-0.42	-0.22
8	-0.50	1.65	2.15
9	0.20	0.49	0.29
10	-0.60	0.02	0.62
11	0.10	-1.52	-1.62
12	0.00	1.36	1.36
13	-0.50	-0.83	-0.33
14	2.20	0.32	-1.88
15	-0.40	2.01	2.41
16	0.00	1.66	1.66

VITA

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Master of Science

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